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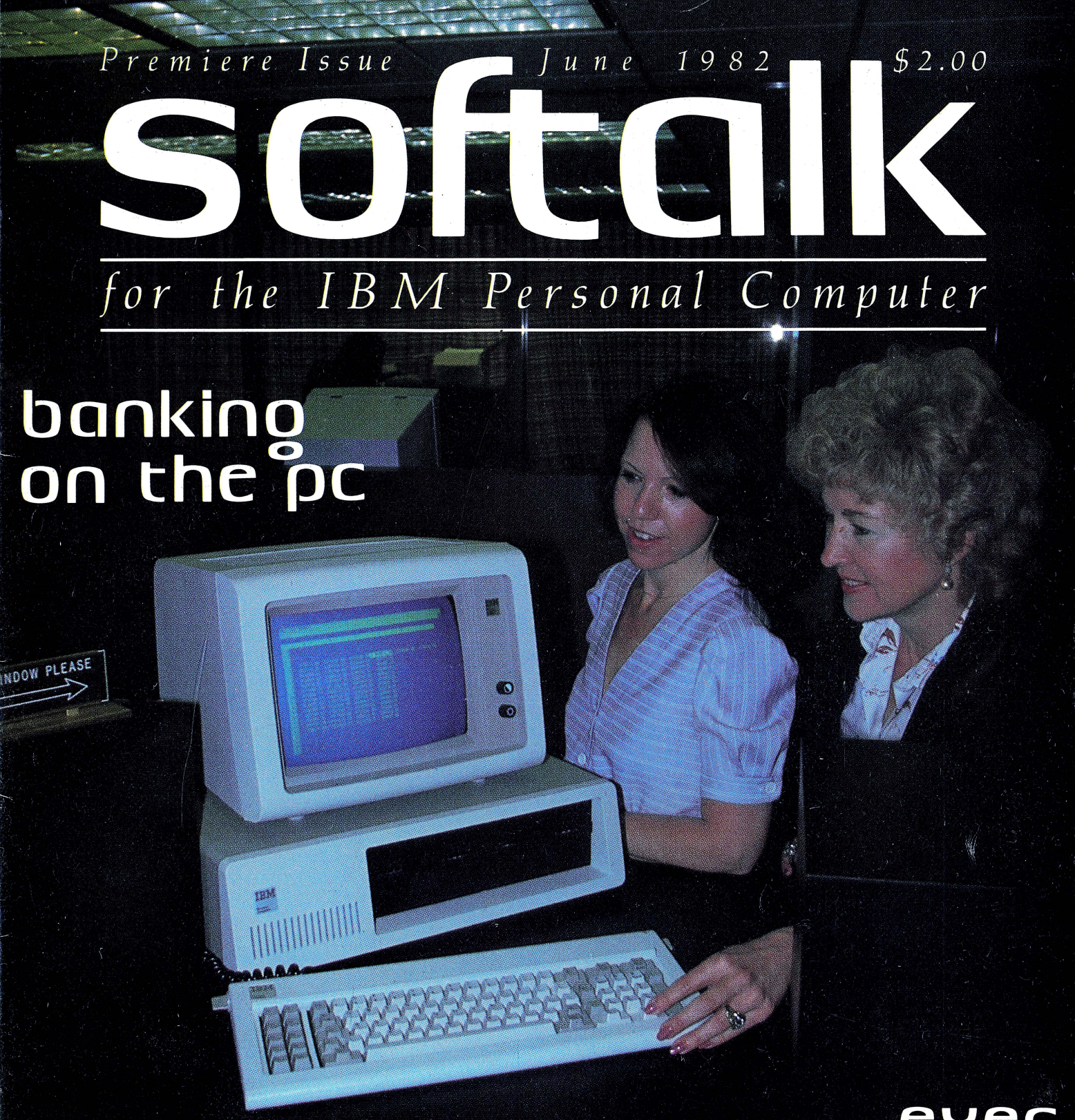

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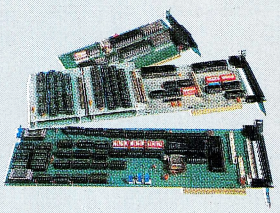

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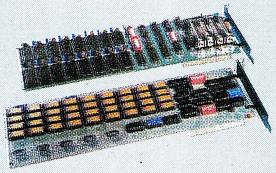

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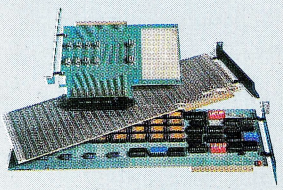

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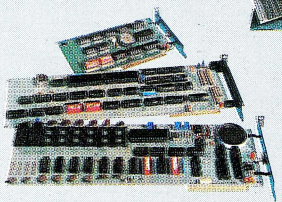

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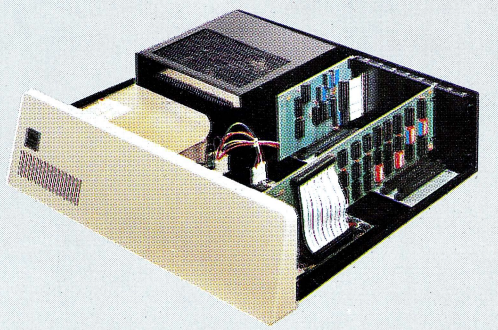

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straightalk

Softalk Publishing was founded on the premise that personal computers are for people of all kinds, not just for specialists. Whether you're a business person or a hobbyist, a computer scientist or a novice, whether you do your own programming or not, the personal computer is meant for you. And, because you've chosen the IBM as your personal computer, *Softalk for the IBM Personal Computer* is yours as well.

On the strength of this premise, the original *Softalk*, for the Apple, has grown to more than 200 pages and reaches nearly a hundred thousand Apple owners a month. With your input and support, *Softalk for the IBM Personal Computer* can do the equivalent and better.

Each month's *Softalk* will bring vital information to help you get the most out of your pc. We'll tell the stories of people like you who are doing remarkable things with their computers, and we'll keep you informed about how the microcomputer revolution is affecting the quality of life all over the world.

Three of our monthly columns are devoted entirely to information about products for the pc. Marketalk News consists of brief items about the newest software and hardware, as well as books, seminars, shows, summer camps, and other resources of interest, while Marketalk Reviews provides more detailed evaluations of new hardware and software. At the back of the magazine each month, you'll find a list of the bestselling software for the pc.

This month we introduce our first four tutorial columns. In the Profit Plot, Shirley Fisher has a dual objective: to acquaint you with software tools for financial planning and to demonstrate their use in specific business applications. Fisher, a programmer with Hughes Aircraft, begins this month with a cash flow analysis using *VisiCalc*.

Alan Boyd and Richard Kaapke address opposite aspects of the pc in System Notebook and Boards and Buses, respectively. Boyd, who is manager of product development for Microsoft, focuses on system software, while Kaapke concerns himself with hardware aspects of the Personal Computer. Kaapke is Personal Systems Manager for Computerland of San Diego.

And for newcomers to computing, we offer Beginners' Corner, a series that treats fundamental topics about computers in general and the pc in particular.

Future issues will also feature a column called Crosstalk, which will provide you an opportunity to communicate with other readers as well as with the authors and editors of *Softalk*. If you have ideas to share or questions to ask, Crosstalk will be your column.

This is the premiere issue of *Softalk for the IBM Personal Computer*. If you own a pc, you're entitled to a free trial subscription. If you've picked up this copy at a store or are perusing a friend's copy, you have only to send us your name, address, and pc serial number to begin your free subscription. You'll find details elsewhere on this page.

We bid you welcome and hope you enjoy *Softalk*.

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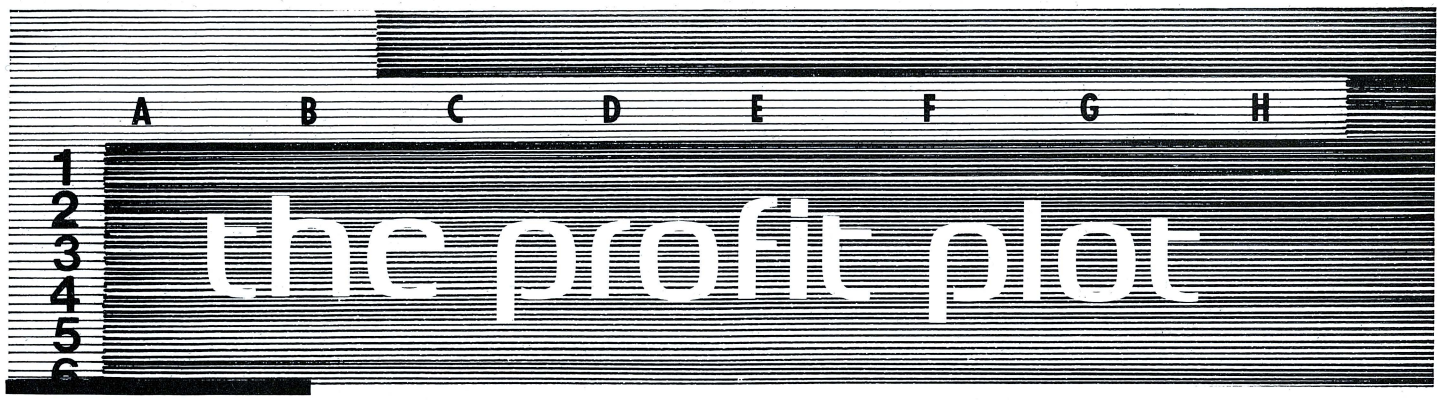


by Shirley Fisher

How's business?

Are your sales down because the economy is in a downturn, or are you doing something wrong? Are your profits up because you're lucky, or because you made a smart move? How do you know?

Is what's true for big business true for you? Not necessarily. Interest rates are high and money is tight. For the small firm, tight credit means not only that money will be expensive but that it may be unavailable at any price. Funds in individual retirement accounts and Keough plans will most likely not be invested with small businesses because of investment restrictions. Wage and energy costs keep rising, but what about levels of production?

What can you do about your business situation? How can you keep on top of things when there is so much information flowing across your desk every day? These problems are very real, whatever the size of your business. But they can be an even bigger problem to the owner of a small business.

Business management has often been referred to as a science, but much of what has been written is about the science, not about management. In a laboratory experiment, you can construct an apparatus to measure something and use it to observe the effect of one variable upon another, while you keep everything else constant. You analyze and observe, make predictions of new solutions, take new measurements and compare them with your predictions. When they don't agree, you make some adjustments and try again. In this way you have some control over the experiment. In the real world of business you can't exercise complete or even partial control over all the variables, so you can't observe directly the effect of one variable on another.

Computers have been added to the list of tools for today's manager. Their speed and the ability of the computer to do number crunching has freed time and energy to allow the manager to examine less well behaved problems.

In a broad sense, the manager has two ways to obtain greater profits—by profit squeezing and profit seeking. Changing ways of doing things to reduce waste, inefficiency, delays, and so on creates more profit from existing goods and services. Finding new products, services, or processes, choosing the location for a new plant, or opening up a new territory are examples of seeking new profit sources.

Creating new procedures takes time. It's usually not an overnight venture. First someone has to realize that something might be wrong. Next, who in your organization, if anyone, has the experience necessary to do the job and can be spared from current assignments? Will the change be worth the time and money spent? If you've been doing things a certain way for a number of years, your employees may be quite reluctant to change and adopt your new method. It would be nice if you could try your ideas out before you spend a lot of time and money. If you could get an advance look at the outcome of your ideas before you put them into practice, you'd have a better feeling about your decisions. This is one area where modeling can help you make important business decisions.

Profit and the Art of Model Building. What exactly is modeling anyway? Let's use an example of a decision process to clarify this a little.

Suppose that you have a food processing plant and you have a production management decision to make. In your business you buy vegetables from farmers, process the vegetables, and package them in cans that you also manufacture. Your plant works a forty-hour week and has three departments—the can department, which makes the containers; the processing department, which prepares and cooks the vegetables; and the packing department, which fills and labels the cans.

To keep the model fairly simple, assume that the farmers are currently offering only peas and tomatoes. Assume that each can of peas you process yields you two cents profit, while each can of tomatoes yields three cents profit. Simple decision, you say. Just can all tomatoes and no peas and you'll make the most profit possible.

But that's too simple a solution. You wouldn't really need to build a model for a situation like that, so let's add some more conditions to our model. The packing department has a maximum capacity of 50,000 cans a week, regardless of what's inside. That added information doesn't alter your first decision. It only limits the maximum profit.

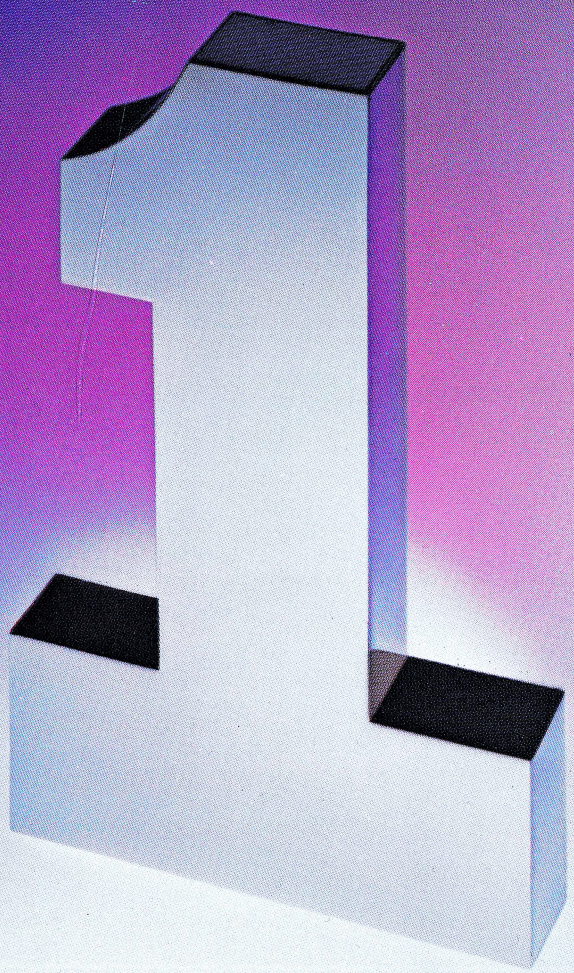
To add some interest to our model, add another condition. The can department can only produce a maximum of 30,000 cans per week. Unless you have a stockpile of cans waiting to be filled, this piece of information puts another restriction on your decision. The processing department tells you that it takes them .002 hours to process a can of tomatoes but only .001 hours to process a can of peas. To complicate things further, you discover that the farmers in the area can only provide enough tomatoes to process 20,000 cans. They also have enough peas to allow you to process 25,000 cans.

Now your decision is not so simple and clear cut. Further restrictions and conditions could be added to make the model more and more realistic, but the production decision is already sufficiently complicated to suggest the difficulties that might be encountered. Maximum profit may not necessarily be the goal in your model. You might be interested in maximum utilization of equipment or in maintaining a steady level of employment. Your objective and the clarity with which it's stated govern the form your particular model will take.

Many of your management decisions will involve the need for historical data from your company records. You will need some way to manipulate all this information in a timely manner. This is an area in which the electronic spreadsheet can become your best friend.

Perhaps you experience a cash flow problem in your business from time to time. If there were some way you could forecast when this might occur, you could take steps to level it out. When cash isn't available to meet the payroll, it really doesn't make much

How to get the most out of your IBM Personal Computer in one easy step.



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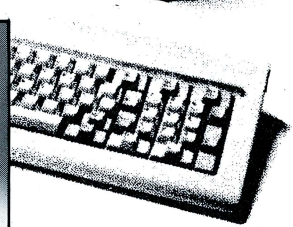

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difference whether it's tied up in inventory or invested in capital items or whatever—it just isn't there. With today's high interest rates, a trip to the bank for short-term funds to tide you over can add to your cash problems downstream.

If you go to the bank for a loan, chances are you or your accountant will have prepared a cash budget. This monthly breakdown of your annual expenses and income spells out your cash needs as well as cash availability. True, it's historical data about your company, but tracking it for an extended period of time can reveal problem spots and increase the time you have to resolve them.

Let's use *VisiCalc* to create an example of a company with a cash flow problem.

Getting with the Flow. This sample cash budget is for a cash-and-carry merchandiser whose best revenues are produced in the Christmas selling season, with a sales slump in late summer. We will need twelve columns to represent the months of the year, a totals column, and at least four columns for descriptive labels.

If your printer can handle a 132-character line, you will want to set up seventeen columns each no more than seven characters wide. To do this type /GC7 and hit the enter key. We will set up the months and the TOTALS label across row 1 beginning at location E1 with JAN and ending at Q1 with TOTALS. Use /FR for the column labels to make them align with the numeric data you'll enter below.

At A3 we'll begin filling in the labels to identify the items we wish to include in our cash flow budget sheet. To make our sheet easy to read, we'll leave a blank line between our income and expenses and another one to set off the totals we wish to track.

Here are the labels we will use for this example.

REVENUES

COST OF GOODS SOLD
RENT & UTILITIES
WAGES & BENEFITS
DEPRECIATION
ADMINISTRATIVE & OFFICE EXP
INTEREST EXP
TAXES (EXCEPT INCOME TAX)

TOTAL CASH REQUIREMENTS
CASH SURPLUS (DEFICIT)
CUMULATIVE SURPLUS (DEFICIT)

Now we're ready to fill in the information and see where we stand. The monthly figures for REVENUE should reflect the actual cash received for the month, not the sales. Unless a business is strictly cash-and-carry, there will be credit sales to consider. If an average collection period is thirty days, proceeds from credit sales made in January will not be received until February and

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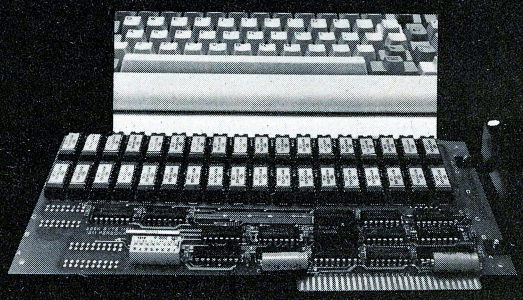

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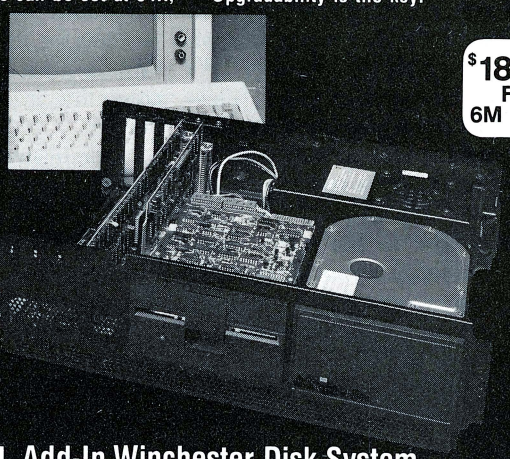

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should not be included as January revenue. Our merchandiser had cash receipts of $75,000 in January and November, $25,000 in February through May, $25,000 in July through October, and $50,000 for the month of June. Now we are ready to itemize monthly expenses.

Inventory is the largest expense item for our merchandiser and therefore has a substantial effect on cash flow. There is usually a time lag between the date inventory is acquired and paid for and the date it is sold. During a revenue slump, payments to suppliers can put a big drain on available cash reserves. There is a strong temptation to build inventories in months of cash surplus, whether to take advantage of special sales, try out a new line, or whatever. A problem arises if this same cash surplus is needed in future months to compensate for cash deficits.

A good cash budget picture will allow our merchandiser to balance future cash needs against present cash surpluses, thereby getting a better idea of a safe level of reinvestment of true cash surplus. Our sample merchandiser had the following inventory expenses to enter as cost of goods sold: $17,500 for January through March and May through August. In April he took advantage of a sale and had expenses of $35,000. In September he began building inventory for the projected Christmas season's business. September and November expenses were $52,500 while November soared to $70,000.

Rent and utilities is generally a stable expense, except when expansion or a move to a new location is scheduled, or when a lease comes due for renewal. Of course, any change should be budgeted whenever it goes into effect. Our merchandiser had a steady expense of $1,000 a month. Whenever you have the same entry to make many times across a row or down a column, you can save yourself some typing time and reduce the possibility of errors by using the replicate command. First enter the $1,000 expense for January at E6. Then, still at E6, type /R, hit the enter key, type E6.P6 and hit enter again. The amount at E6 will be replicated across the row through P6 for December.

Wages and benefits expense may be variable, fixed, or a combination of the two, depending on how the employees are paid. Amounts paid to employees on commission will vary with sales. Depending on how commissions are paid, they should be budgeted either in the month the sale is made or in the month in which payment is received. For our cash flow budget, the expense should be budgeted in the month in which it actually must be paid. If all employees are salaried or paid on an hourly basis, the expense is more uniform from month to month. Exceptions to this would be things like pay increases, overtime, and part-time help during peak seasons. Our merchandiser began the year with expenses of $5,000 in January and February, but pay increases caused an increase to $5,500 for the remainder of the year. You can again make use of the replicate command to enter this information. At E7 and F7 enter 5000. At G7, enter 5500. While at G7 type /R, hit enter, type G7.P7, and hit enter again.

Depreciation is, in theory, a cash reserve set aside to replace worn out equipment. Unless new capital expenditures are planned or existing equipment is fully depreciated during the year, this expense can usually be divided into equal monthly amounts. Our merchandiser showed a monthly reserve of $200 until November, when he increased it to $250 for the remainder of the year. You can use the replicate command again to enter this information into the cash flow budget.

Administrative and office expense covers several items: professional fees, insurance, travel to trade shows, and even bonuses and dividends paid to officers, employees, and owners. This is another area where it's tempting to pay out dividends and bonuses in months of cash surplus. The payment of such items may, however, deplete cash needed later in deficit months. Our merchandiser was conservative in this area and only increased his expense at the same time his wages and benefits expense increased—and by almost the same percentage. In January and February he had expenses of $2,750, which rose to $3,000 in March through December.

Interest expense maintained a steady $420 per month until November when it dropped to $400. Taxes were mostly payroll taxes (not including income tax) and workmen's compensation. This was a steady expense of $800 except for the last month of each quarter when it became $900.

To Calculate and Replicate. Now we have all the monthly figures entered into the cash flow budget, but we still need to calculate totals. At this point, we will use the @SUM function to add the monthly figures for us. This is done by positioning the cursor at the totals location and telling the computer the range over which to add. We will begin by finding the total revenues.

At Q3 type @SUM(E3.P3) and hit enter. Since we want to perform the same function for the expense rows, we can use the replicate command again to duplicate the @SUM function for each expense. Type /R, enter, Q5.Q11, and enter. Answer RR to the relative/no change questions. You will now see totals displayed for all the rows of revenues and expenses.

Now we need to use the @SUM function vertically down a column to add each month's expenses. To do this, move to location E13 and type @SUM(E5.E11) and hit enter. This gives us the cash requirement for January. To obtain the monthly requirements for the rest of the year as well as the yearly total cash requirements, use the replicate command again. Type /R, enter, F13.Q13, enter, RR.

To find the cash position for January, move to E14 and type +E3−E13, enter. Remember that if an entry begins with a letter, it will be treated as a label, so don't forget the plus sign. Again, the replicate command may be used to find the monthly and year-end cash position. Type /R, enter, F14.Q14, enter, RR.

The month-to-date cash surplus or deficit is found by adding the previous cumulative surplus (or deficit) to the present month's cash surplus (or deficit). Of course, for the first month there is no previous month, so the entry is merely the first month's cash surplus (or deficit). At E15 type +E14, enter, and at F15, type +E15+F14, enter. Still at F15, use the replicate command to fill in the remaining months. Type /R, enter, G15.P15, enter, RR.

Now that our sample is complete, it's easy to see the months in which there is a negative cash flow—July-August and October-November. Cash revenues from January through June are large enough to cover through the August shortage but not all of September and none of October and November. Recall that this was the period in which inventory expense was higher in preparation for the Christmas season. Unless our merchandiser has some earnings from the previous year to cover September-November, he will have to find some alternative methods to finance his cash needs. If these cash needs can be anticipated far enough in advance, they can be covered with previously generated business earnings rather than from outside sources.

The true value of a cash flow budget is that it uncovers cash requirements that might otherwise be hidden in a perfectly healthy looking annual budget. A much more detailed budget that includes more items could add to the budgeting accuracy and make it an even more valuable planning tool. But even with the few categories we used in this example, you can see by changing a few of the numbers how quickly you can get a picture of the changing conditions of a business.

Start with this example and then substitute figures from your own business records. You'll quickly get a feeling of the power of this planning tool. It gives you a quick and almost effortless way to play "what if" without actually expending a lot of your time and money in the process. Δ

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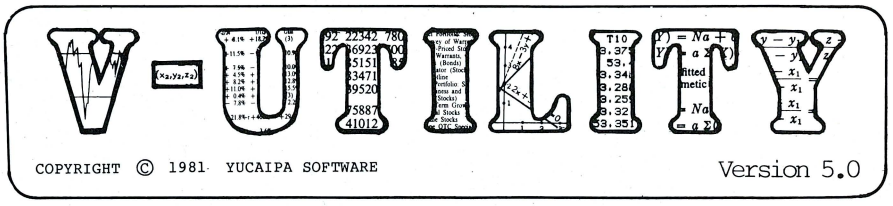

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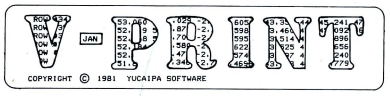

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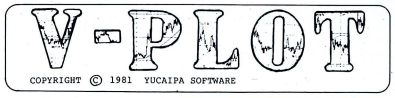

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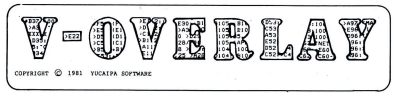

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Exec Software Arts: What's After *VisiCalc*?

Robert Frankston, left, and Daniel Bricklin, with their illustrious brainchild.

by Craig Stinson

On the twelfth floor of a modest high-rise in Cambridge, Massachusetts, a band of fifty are at work on a top-secret project.

They're not doing weapons research, you can be sure of that. They don't look sinister enough. Most of this crew looks like they might be grad students. They're all walking around in blue jeans and shirtsleeves, or something equivalent.

The two guys in charge look about like the rest of the group, only maybe a couple years older. One of them, the taller one, with the black beard, seems at ease with his guest from the outside. He talks about bicycles and "human interfaces." The other man, quieter, more reserved, talks mostly of computers.

Computers are plentiful here. There are micros of every description—IBMs, Apples, Pets, miscellaneous Japanese micros, and others. In the center of the suite is an air-conditioned room with a couple of Prime 850 minicomputers. Coaxial cables lead from this central room to other parts of the suite, tying the Primes to the micros.

Various people are working at the microcomputers, some of them programming, others preparing documents on word processors. Others are reading or sending messages on a centralized, intraoffice electronic mail system.

There's an earnestness in the air, in spite of the occupants' casual demeanor. People here act as though they're working on something that matters.

You'd probably feel that way too if you were about to publish the followup act to *VisiCalc*.

The company is Software Arts. The guy with the beard is Daniel Bricklin, who, as a student at the Harvard Business School, dreamed up a "magic blackboard" to relieve the tedium of spreadsheet analysis. His partner, Robert Frankston, encoded the blackboard idea on a 6502 and thereby created the world's most celebrated piece of computer software.

They seem too benign to be revolutionaries and too relaxed to be the chairman and president of a three-and-a-half-million-dollar business. But they are.

Under Wraps. Secrecy is not new to

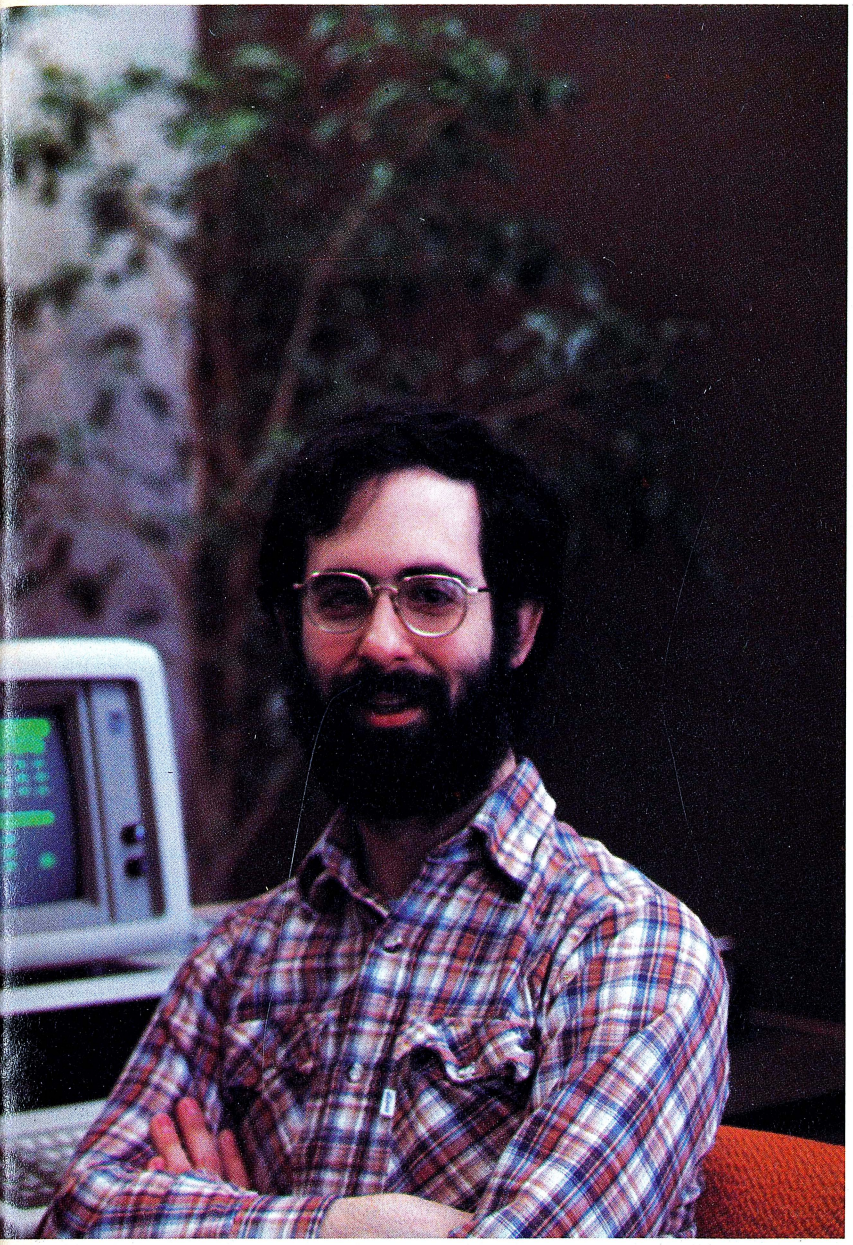

photo by Roycroft

Software Arts. A year ago, when the pc was only a rumor to most of us, this office suite was one of the few places outside of Florida and Bellevue, Washington, that possessed a working model. It was kept behind a total of three locked doors, if you count the security guard downstairs as a locked door.

IBM, of course, wanted to be able to offer *VisiCalc* the same day they released the pc. *VisiCalc*, after all, had been for nearly three years the celebrated software tail that wagged the personal computer dog; it wouldn't do to let the critter out without that appendage.

Bricklin recalls that representatives of IBM would show up unannounced from time to time, just to make sure the pc was still properly enshrouded. "We finally had to warn them," he says, "that we had people from other computer companies coming in here too, and that it would be really awkward if they dropped in on us at the wrong time."

This time the secrecy edict has been imposed from within.

VisiGrowth. Software Arts has been essentially a one-product company throughout the three years of its existence. To be sure, it's spread that one product out over a dozen brands of computer, fine-tuning it for each. And it's brought the program through several major revisions.

VisiCalc has changed a good deal since it first appeared. Most notably, in the latest revision there is a new file structure, called Data Interchange Format (DIF) that allows the transfer of information from *VisiCalc* applications to related programs, like database managers or statistics packages. They've published the technical specifications for DIF files and established an information service called the DIF Clearing House, in an effort to promote the use of DIF by other commercial software houses.

Last fall they began publication of a bimonthly newsletter, called *Software Arts Technical Notes* (spelled SATN, for short, and pronounced "satin") to provide a continuing education service for *VisiCalc* users. The journal, edited by Jack McGrath, contains information on a variety of subjects, from financial analysis techniques to recreational uses of *VisiCalc*.

Software Arts has also devoted a good deal of its programming energy and expertise to the development of in-house tools, so that, for example, when it came time to put *VisiCalc* on the pc, they didn't need to depend on IBM for assemblers and other program development paraphernalia. Among other things, they've also created their own electronic mail system and a complex editor, written in PL/I, for their Prime 850s.

So they've not been idle. But the general public has had rather little contact with them. *VisiCalc* users are more apt to know the name of *VisiCalc*'s publisher—Personal Software, recently renamed VisiCorp—than of its authors.

But the low-key character of Software Arts has started to change of late. The company has hired an aggressive PR firm in Boston to put its name before the public. Bricklin has been making speeches at conventions and trade shows, under the title "After *VisiCalc*, What?" And for months now, the word has been given out that Software Arts was, finally, about to release a "major new product."

The Roots of VisiCalc. The company's first offering arrived without any such fanfare.

Bricklin was a graduate student at the Harvard Business School in 1978, when the light bulb went on. The mother of this invention was a certain form of misery commonly inflicted by the B-school professors. Students were sent home at the end of a day to prepare extensive spreadsheet analyses of hypothetical companies—projections of where a company might be at various points in time, given certain assumptions. Usually someone's version of these projections would be presented to the class at a subsequent session.

It was tedious work. Hundreds of individual calculations had to be performed to arrive at meaningful results. But if doing the

projection was fatiguing, revising it was maddening. It occurred to Bricklin that there might be a way to program a computer to do the tedious work, so that individual parameters in a matrix of assumptions could be changed without sending a human into convulsions of erasure and recalculation.

To be sure, this idea didn't come out of nowhere. Bricklin, after graduating from MIT in 1973, went to work for Digital Equipment Corporation, doing programming for typesetting applications. So he was thoroughly conversant with word-processing concepts by the time he got to Harvard Business School in 1977. The idea of using a computer to do spreadsheet analysis was an extension of a fundamental word-processing tenet: a person shouldn't have to rip up his work and start over just because he changes his mind.

Bricklin took the idea to Bob Frankston, a friend of long standing and a colleague from undergraduate days at MIT. The two men, at this time both in their late twenties, had planned since teenage years to start a business together of some kind, some day. The magic blackboard idea looked like the right opportunity.

The first test version of *VisiCalc*, coded in Basic, was finished in October of 1978. Frankston and Bricklin look back on it now with fond parental pride. Frankston admits modestly that "it often gave the right answers."

One of the people who saw the primitive calculator was Dan Fylstra, a classmate of Bricklin's at the B-school. Fylstra had started a small software publishing venture and had gotten together a few games to run on the Apple II.

The Software Arts management team. Standing: Julian Lange, Steve Bayle, Dave McElfresh, and Tracy Licklider. Seated: Bob Frankston and Dan Bricklin.

Like all other microcomputers of this bygone age, the Apple was primarily a hobbyist's machine, used at home. Fylstra was hoping to add a strong home budgeting program to his catalog and thought that *VisiCalc* might do.

The following month, at a Chinese restaurant in Cambridge, a deal was struck between Fylstra's Personal Software and the two cofounders of Software Arts. The goals agreed upon for *VisiCalc* were that it would run in 16K, would have menus, and would recalculate in ten seconds or less.

The first office of Software Arts was an attic in Frankston's house. There, over Christmas in 1978, on an Apple borrowed from Fylstra, the ancestral *VisiCalc* underwent conversion to machine language. Frankston, whose programming powers are described by Bricklin in tones of solemn respect and admiration, knew the 6502 well, having already written a Basic for it.

That first machine-language version, finished early in 1979, ran in 20K, missing the group's stated goal by some 4,000 bytes. It would make a nifty collector's item, if you could get hold of a copy. It didn't scroll; what you saw on screen was just what you got. It didn't do any division. But it did allow you to save data on cassette tape.

Frankston and Bricklin spent the early part of 1979 expanding their program, adding more and more power while honing down the code. The menu idea was forsaken, in order to keep the size of the program from crowding out the user's workspace. The cassette storage options were also abandoned quickly, in keeping with the changing tenor of the times and the new availability of a reliable disk operating system from Apple.

They also began showing *VisiCalc* prototypes around to a few people in the industry—without exactly setting minds ablaze. Among the notably unimpressed were one of Bricklin's professors at Harvard, and, according to Bricklin, the people at Apple Computer. The latter group were to change their mind soon enough. *VisiCalc* was available on the Apple for a year before it appeared on any other machine. That period of exclusive availability played an essential part in establishing Apple's dominant position in the personal computer industry.

One person who did see promise in the program was industry analyst Ben Rosen. In July of 1979, two months before the general public got a look at *VisiCalc*, Rosen penned that famous, prophetic remark about the tail wagging the dog. He described the program as "convenient" and "universal" and said that it was "hard [for him] to imagine any serious user of a personal computer not owning—and frequently using—*VisiCalc*."

The two coauthors believed in their product enough to put up a substantial chunk of their own resources. The development costs of *VisiCalc* ran to a healthy six figures, and in spite of first-year sales of around 150,000 copies, Software Arts didn't get into the black until mid-1980.

Teamwork. Two important develop-

ments marked the autumn of 1980: the company began to deliver *VisiCalc* on other computers—the TRS-80 Model I, the Pet, and the Atari, for starters—and they started hiring a professional management team to keep the growth from getting out of control. Tracy Licklider and Julian Lange came aboard as vice president of operations and chief operating officer, respectively. Licklider and Lange today handle most of the day-to-day business affairs of Software Arts.

The staff has grown from four in 1979 to about fifty today. Without looking at records no one knows for sure how many there are, because the number increases so frequently.

It's a young, highly motivated, highly educated crew. There are probably more advanced degrees per square foot here than in any other micro software house in the country. The backgrounds are diverse: Lange has a doctorate in economics; Frankston and Bricklin sport masters degrees in engineering and business, respectively; others on the staff have training in sociology, education, chemistry, American history, and philosophy. Such intellectual vitality and variety is remarkable but not altogether astonishing in a setting like Cambridge; Software Arts is about a ten-minute walk from both Harvard and MIT.

The actual programming staff now numbers seventeen, under the direction of Dave McElfresh. That number will be growing over the next year—but slowly. Like the Marines, McElfresh is looking for a few good men and women.

Before the staff can get much larger, however, they're going to need to move. Present quarters are full. The company has bought a three-story building in Wellesley and plans to move in some time this summer.

What's Next? By that time the "major new product"—whatever it may be—should have been revealed.

Bricklin has been throwing out some tantalizing hints. In a speech in San Francisco in March, he spoke of elementary operations—fundamental applications like word processing and spreadsheet analysis, as opposed to specific ones like mailing list programs and accounting packages. "There are still many elementary operations to be developed in business," he claimed. "In other areas—home use, for example—almost no elementary operations have been defined."

Most computer users would agree that word processing, spreadsheet analysis, and perhaps general-purpose database management constitute irreducibly fundamental applications. Most users also would be hard pressed to come up with any other applications on that level of generality. If you had to throw out all but five pieces of your software library, what would you keep?

Part of what's remarkable about *VisiCalc* is that, like word processing, it seems like such an obvious use for a computer. Like certain great works of music, it has the quality of seeming to have been discovered, rather than invented. And trying to imagine microcomputers without *VisiCalc* is, from this three-year-distant perspective, like trying to think about music without the *Rite of Spring*.

But of course the obvious is sometimes a little hard to see. To quote Bricklin once more, "Spreadsheets could have been done ten years ago. You could have written *VisiCalc* on a PDP-8. The technology was there; it's the idea that was missing. And there are many more ideas out there waiting to be found."

Who knows? Maybe another one has been found. Δ

New: Versatile Tool Kit Program

Shortly before this issue went to press, Software Arts announced that their new product, called *TK!Solver*, will be available in "fourth quarter, 1982," in versions for the 128K IBM pc and the 48K Apple II. *TK!Solver* is a nonspreadsheet electronic calculator program. It will allow the user to define relationships between variables and save the definitions on disk.

The program will be equipped to perform standard mathematical and business functions—such things as sines and cosines, net present value and internal rate of return. It will also convert units automatically between metric and English measurement systems.

Along with the main *TK!Solver* program, Software Arts will be releasing a series of professional applications modules. These will come preprogrammed with both standard formulas and commonly used data. The modules will therefore function as both reference manual and calculator. The user will be able to modify and extend the data that comes with these application disks.

Initial applications options will include mechanical engineering, financial analysis, high school science, and architectural design and construction. Other packages, still in development, will be in the areas of engineering, business, and education.

Software Arts will publish *TK!Solver* themselves; announced retail price for the main program is $300. Δ

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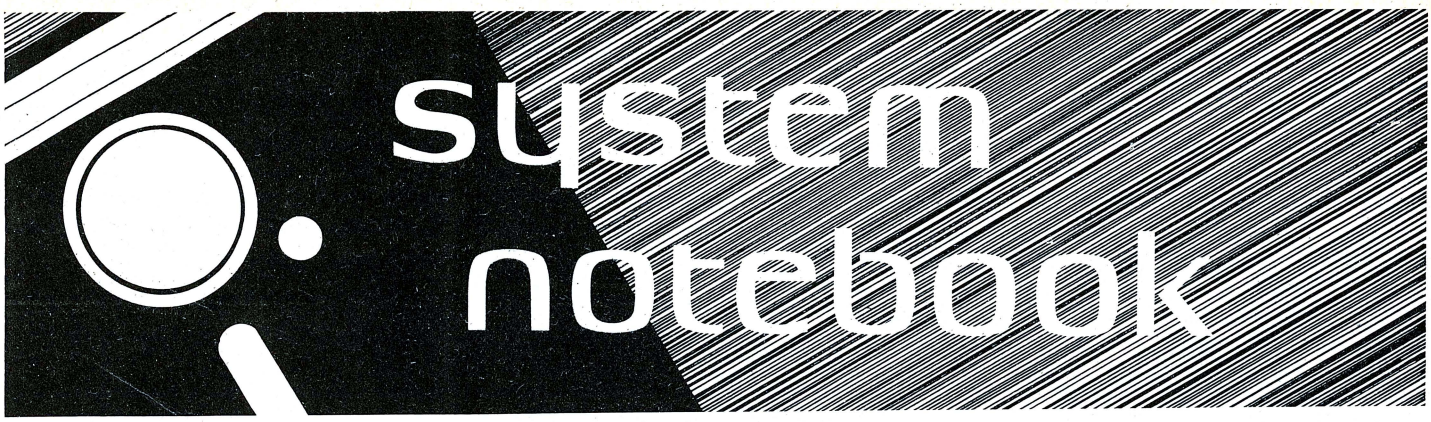

by Alan Boyd

The IBM Personal Computer blends some of the more desirable features of earlier microcomputers with innovations and attractive, functional packaging.

International Business Machines, which, according to *Fortune* magazine, was the eighth largest corporation in the United States last year and the largest computer company in the world, has done more than just introduce another personal computer. Many industry experts consider the pc an endorsement, a recognition of the very existence of the microcomputer industry. This acknowledgement, the fact that the adolescent, hobbyist-oriented, personal computer is important enough to attract the attention of the world's largest computer company, means that the personal computer industry is here to stay.

Newcomers to personal computing will be confronted with the weird and wonderful terms and concepts that veterans take for granted. This column is dedicated to those newcomers, although it will not ignore the needs of those others who have already experienced personal computers before the pc—back when computers were sometimes designed or built in garages.

Saved the Best. Many of the features that were introduced on the Radio Shack TRS-80, the Apples II and III, and even on the Altair, the first personal computer, have found their way onto the pc. The overall performance of personal computers has, of course, greatly increased since the early days, but it is interesting that IBM has traded pure speed, which most people associate with computer performance, for ergonomics, both in packaging and in operation. Consequently, the pc is not only more powerful than its predecessors, but considerably easier to use as well. IBM has managed to maintain a balance between what the technical market wanted and what the commercial market really needed. The result is a powerful, usable computer for noncomputer people.

The aim of this column is to bring you closer to the pc by explaining how you can take advantage of the full range of its capabilities. Most of the time we'll focus on the software part of the pc, since that's the part that, by definition, is open to user participation. Only a few people will be interested in designing hardware interfaces or peripheral cards for the pc, but many will be interested in either programming their own applications or customizing existing programs.

Let's Get Physical. The hardware does require a short introduction, however, since a cursory knowledge of the hardware is prerequisite to a full understanding of the software. At a later date, we'll examine some of the hardware components, since some parts demand an intimate understanding before they can be programmed. For now an overview will suffice.

The pc consists of a microprocessor, several peripheral processors, main user memory, expansion slots, peripheral cards and devices, and electrical systems that make everything work. That's all you need to know about the hardware in order to get started with the system.

All the programmable components are brought together by one very important piece of software—the operating system. Therefore, making the pc work for its living doesn't require that you learn about bus structures or about how to interpret hardware timing diagrams. If you wish to control the hardware, the best approach is to learn to use the software that comes with it. By mastering the operating system, you can master each of the individual components and have them perform amazing tasks on demand.

The operating system, perhaps the most important piece of software running on any computer, manages the keyboard, video displays, disk drives, printer, and any other components attached to the computer. It also handles the mundane tasks associated with data and file manipulation, so that the user needs only to issue very simple and general commands. For example, reading a file from a floppy disk into memory requires only a simple operating system command. You don't need to know how the computer stores information on the disk, how it's coded or decoded, or where on the disk it is stored; the operating system takes care of all these details.

Triple Treat. IBM has done something unusual with the pc: it's offering not one, but three operating systems. The choices are CP/M-86, from Digital Research; the p-System, developed at the University of California at San Diego and marketed by SofTech Microsystems, and PC-DOS, developed for

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IBM by Microsoft. One of these options, the p-System, has been around for years; another, CP/M-86, is an adaptation for sixteen-bit machines of a popular eight-bit system. The third, PC-DOS, was written specifically for the pc and similar 8086- or 8088-based computers. The availability of all three systems for the pc may be confusing to some pc owners or prospective owners, but, as we'll see, the apparent redundancy was motivated by some subtle marketing considerations.

Understanding IBM's Strategy. In the heyday of eight-bit computers, hardware design was a relatively simple decision for manufacturers, since there were only a few microprocessor chips available, and some of those were fully compatible with each other. Software thus became the gating factor.

Computers were designed around the existing applications software base. The fact that most computer manufacturers opted to use existing technology—eight-bit machines, usually with an Intel 8080 or a compatible Zilog Z80 microprocessor, and most often with the CP/M operating system—made possible the birth of a new industry, that of the independent software vendors.

These ISVs were usually small companies dedicated to designing and implementing software for a specific segment of the market. They usually possessed two definable skills—programming abilities and content expertise.

The ISVs were so integral to the growth of the personal computer industry that the industry wouldn't have reached maturity without them. Even today, few large companies have developed the skills necessary to compete against the ISVs. It's because of the ISVs that IBM offers a selection of operating systems.

It's important that the ISVs be able to maximize their efforts so that they can address the largest possible market with the least amount of redundancy. So they usually write software either for a popular computer, which offers a significant market, or for a "portable" operating system, that can permit their software to run on a number of different computers.

Computer manufacturers are therefore faced with two strategic options in developing a new system—they can select a portable operating system or develop a proprietary operating system and hope that the opportunity is nevertheless sufficiently attractive to the ISVs.

Manufacturers who selected the latter alternative often ran into the software version of the chicken-and-the-egg conundrum. They couldn't persuade customers to purchase their computer because there wasn't enough ISV-generated applications software to make it worthwhile, and at the same time they couldn't induce the ISVs to write software because there wasn't a large enough installed-user base. Several computer manufacturers have found themselves in this predicament and have been forced to change horses in midstream by offering a portable operating system as an alternative.

IBM has neatly sidestepped this issue by offering two such operating systems—the p-System and CP/M-86—as well as a totally new one, PC-DOS. We'll take a moment to examine the background of the two standard systems first, so that when we get to technical details concerning PC-DOS we'll be able to put them in better perspective.

Foreign Intrigue. The origins of the p-System can be traced to the arrival of the Pascal language from Europe and its ready adoption into academia in the United States, particularly at the University of California's San Diego campus. A group at the university's Institute for Information Science, under the direction of Kenneth Bowles, saw an opportunity to create a comprehensive programming environment in and around the Pascal language.

Bowles and his students recognized that the effort required to write a Pascal compiler with an integrated operating system for every computer on the market would be considerable. So instead, they developed a method for engineering these systems that allowed them to transport the bulk of the code from one machine to another without having to rewrite it each time.

The p-System uses a scheme that makes it easy to write software on one type of computer and transport it to another. It does this by implementing a translator program on each different computer. The translator is actually a program that emulates some hypothetical computer. Of course, the hypothetical computer is the same on all real computer implementations; it's known as a p-machine; the translator is called a p-machine emulator.

Software written on any of the language compilers that use the p-System is internally different from other types of software. The software cannot be run directly on any normal computer, but it can be run on a p-machine, or any computer that can emulate a p-machine. P-System compilers produce what's called p-code, or pseudo-code. The p-System available for the IBM pc consists of such a p-machine emulator and several language-compilers that produce p-code.

One obvious advantage of this system is that it allows the creation of software that is free from the constraints and limitations of any specific microprocessor. Software developed under the p-System on an IBM pc probably can be transported to, say, an Apple II running the p-System, with little or no modification.

On the other hand, the fact that the computer running such software has to spend as

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much time emulating a p-machine as it does running the applications program in question, means that performance is seriously compromised.

The other factor that has made the p-System attractive has been its adoption by the academic community. The p-System offers the academic world a standard programming environment, so that a student can learn to program in Pascal on a large minicomputer and then switch to a micro and have the environment be essentially unchanged. This means, for example, that one doesn't have to learn an entirely new editor, with its unique set of commands and instructions, when switching to a new computer. The same consistency applies, of course, to assemblers, compilers, and other utilities available under the system. Currently the p-System exists for several families of microprocessor, as well as for some larger computers.

Burning at Both Ends. The p-System is both more and less than simply an operating system. It isn't conducive to the types of high-performance work usually undertaken in CP/M or PC-DOS because the programmer can't ordinarily work in direct contact with the operating system. On the other hand, the p-System incorporates its own set of compilers, each of which produces the same type of pseudo-code.

Initially, the system was implemented around Pascal, but now there are p-code versions of Fortran and Basic as well. These languages coexist in a standard operating environment, along with a host of software development tools, including an editor, a linker, a filer, an assembler, and a debugger. A library of utilities, including Turtlegraphics, is also a part of most p-System implementations.

Overall, the p-System does give software developers an opportunity to write transportable software, although it takes its toll in performance. The other major advantage is its ease of use. It has been adopted by many colleges and universities as a teaching system; consequently, there's a large body of literature available—most notably for the Pascal language. Once a programmer has mastered the p-System languages, however, he'll probably want to move on to the more powerful "native" languages available on the pc. The p-System is priced at $625 and includes a choice of Pascal or Fortran.

CP/M-86 has its roots in its eight-bit predecessor, CP/M, which stands for Control Program/Monitor. CP/M was developed by Gary Kildall in 1974, when he was working as a consultant to Intel, the company that produced the 8080 microprocessor. Kildall designed CP/M to interface his own home-brewed system with his PL/M compiler. When Intel rejected CP/M as a commercial product, Kildall ventured out on his own and formed Digital Research.

Motley Brew. By 1975 several companies, including Altair, Polymorphic, and Processor Technology, were marketing microcomputers. Few companies, however, offered compatible disk drives to go with their computers. Add-on disk drives were being sold by third parties, though, and many of the earliest disk-based systems were hybrids of several manufacturers' components. In this hobbyist-oriented mix-and-match world of early microcomputers, CP/M emerged as the standard that would allow systems to share software.

CP/M's salient feature was the fact that it used IBM standard disk formats. This meant that any computer that could use disks formatted in the manner of IBM, and that contained either an Intel 8080 or a compatible Zilog Z80 microprocessor, could be made to run CP/M.

Several manufacturers quickly adapted CP/M for their systems and shipped it as their standard operating system. As the years went by, a large CP/M software base

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developed, and the operating system became the standard medium for business application software. Internally, however, CP/M changed only marginally during this period, and it didn't attempt to push the state of the art much beyond the very earliest version. In fact, to this day the code necessary to talk to punched paper tape readers is still a part of CP/M, although such tape readers are no longer used on microcomputers, having been replaced long ago by disk drives.

CP/M-86 is a translation of the original eight-bit product onto the sixteen-bit Intel 8086 microprocessor. Since the 8088 used in the IBM is software compatible with the 8086, CP/M-86 will also run on the 8088. One objective of CP/M-86 on the pc is to offer a migration path from the eight-bit systems to the pc, so that it will be easy for all of the independent software vendors (remember them?) to move their applications packages up to sixteen bits. This migration process will be a topic in a future column.

Internally, CP/M-86 functions identically to CP/M. The operating system is logically divided into four distinct parts.

Part and Partners. The part that the user sees is called the CCP, or console command processor. This is the part of the operating system that interprets commands typed at the keyboard and passes them to the remainder of the system. A number of commands are built into the system, but most commands reside on disk and are read into memory from disk when they're invoked.

The BIOS, or basic input/output system, is the part of CP/M-86 that is hardware-dependent and therefore varies with each implementation. The BIOS interfaces with the various hardware components attached to the system.

The BDOS, or basic disk operating system, is the section that manages the disk filing system. And the last section is called the TPA, for transient program area. This is the section that contains whatever application program or high-level language is being run under CP/M.

There are two ways for a CP/M user to talk to the system. The first way is to issue commands, by typing them in at the keyboard. As mentioned earlier, there are two types of commands—built-in ones and disk-resident transient ones. To the user, the only difference is that the operating system must first read a transient command from disk before it can execute it. The advantage of this system is that commands, in the shape of transient, disk-resident programs, can be added to the operating system to customize it for a particular application.

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disks, examining the contents of a disk file, erasing files from a disk, renaming files, configuring the system for a particular hardware set, passing information between the various components of the system, and invoking an applications program.

The second way for the program to talk to CP/M is by making what are known as operating system calls. This is the method programmers use to interface applications software directly to CP/M. Operating system calls are performed by passing certain codes to CP/M and then "jumping" to the operating system. These calls are used to perform such tasks as reading the keyboard, dispatching messages to the screen or printer, reading and writing blocks of data to and from disk, moving data from one device to another, and maintaining disk directories.

This method of communicating with CP/M should be avoided by anyone who is not familiar with assembly language programming. High-level languages that run under CP/M usually take care of these calls for the user.

CP/M-86 functions in a manner just about identical to that of earlier CP/M; this is both a blessing and a curse. It's a blessing because software developers don't need to learn a whole new set of commands, or indeed a whole new operating system, when they move from eight bits to sixteen. It's a curse because CP/M still suffers from outdated capabilities and a lack of user friendliness. CP/M-86 is available as an option on the pc for $240.

PC-DOS is the new operating system that IBM is making available for the pc. All of the applications software and native languages that IBM will ship require PC-DOS.

In light of the preceding discussion of the relative merits of introducing a proprietary operating system as opposed to a portable system, how can this make good business sense for IBM? Why have they chosen a newcomer over a host of standards? Has IBM chosen to forsake the ISVs? Perhaps a brief look at the history and capabilities of PC-DOS will shed some light on this subject.

DOS, as IBM calls the operating system, began its life as the brainchild of Tim Paterson of Seattle Computer Products. Eighty-six DOS, as it is known, was a complementary product for Seattle Computer Products' 8086 microprocessor card for S-100-bus systems. It allowed owners of the card to interface their computer with the host of disks and other peripherals available, much as CP/M had done in the early 1970s.

To make it easier for the independent software vendors (those guys again!) to move their applications programs from the eight-bit world to the 8086-based machines, Paterson designed the interfaces to the operating system in a manner that made his operating system similar to CP/M. To accomplish this, all he had to do was use a similar structure for the system and retain the same calling conventions—the rules governing interface procedures. He wrote the system in 8086 assembly language, and, using CP/M as a conceptual model, designed an operating system that kept the style of CP/M but had fewer limitations.

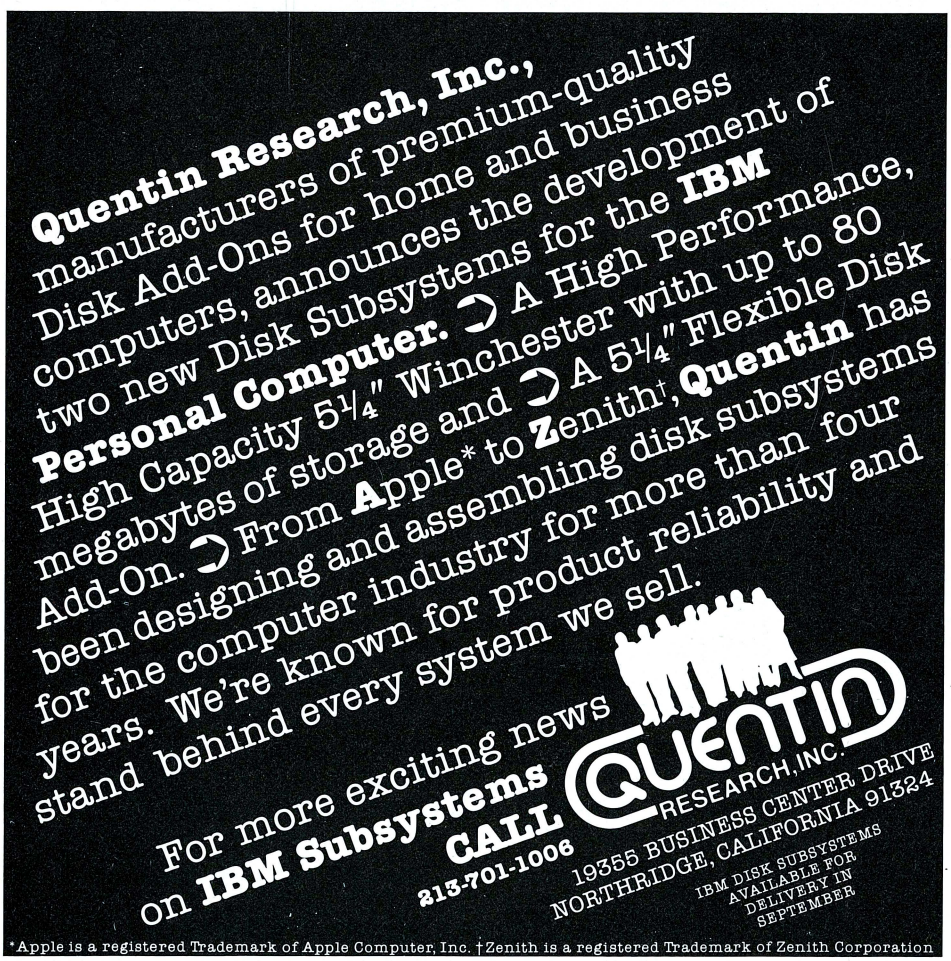
Alphanumeric Soup. As the contracted vendor of an operating system for the pc, Microsoft recognized the value of Paterson's work and licensed his product for distribution. In a later development, Microsoft bought the system outright. Turning 86-DOS over to their own Operating Systems Group, now headed by Tim Paterson, Microsoft produced PC-DOS.

In a related occurrence, Microsoft made the operating system available to the general public under the name MS-DOS, and Lifeboat Associates made Microsoft's DOS available under the name SB-86. So now there is an operating system available on many of the new 8086- and 8088-based computers that is known by several names: 86-DOS, PC-DOS, SB-86, MS-DOS (and even as SCP-DOS and DOS-86 in some areas), and simply as DOS by IBM. All are the same, simply roses by various names.

Already it is clear that any pc user who wants to use *VisiCalc*, Peachtree's accounting packages, *EasyWriter*, or any of the other IBM-supplied software must become familiar with DOS, if only for the purposes of making backups or formatting new data disks. For the ISV with an existing CP/M software library, DOS is as easy to convert to as CP/M-86 is.

Most people already familiar with either CP/M or CP/M-86 will find that DOS behaves in a very similar manner. It works considerably faster, however, and has removed many of the limitations imposed by CP/M. The enhancements include better error-recovery procedures, more flexible file characteristics, and a more efficient file structure. To the casual user, however, the most noticeable enhancement of DOS is that there is no need to "log-on" disks. This removes the necessity to reset the operating system after disks are changed, meaning that the user will never experience the dreaded BDOS ERR READ ONLY situation familiar to CP/M users.

In general DOS is more friendly than CP/M, and employs a more intuitive command syntax. Next month we'll look at its structure and syntax in detail. Δ



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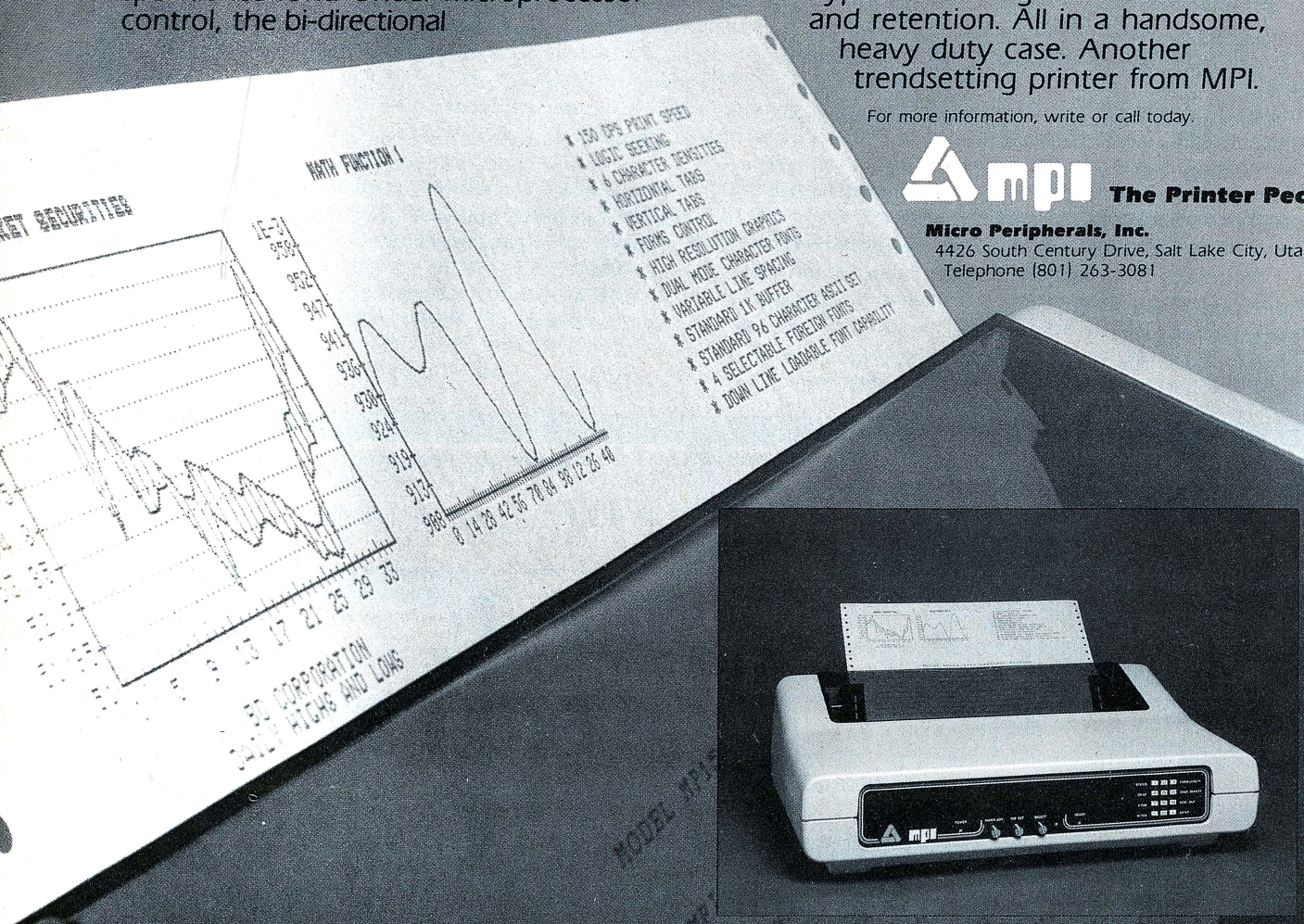

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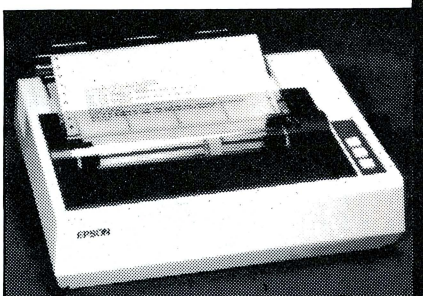

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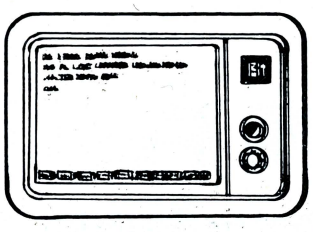

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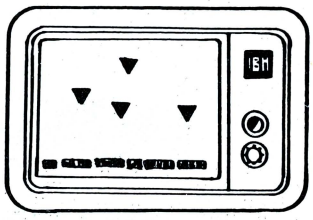

Unless otherwise indicated, software listed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive.

Δ **IBM** has released a DOS version 1.1. It has all the features of version 1.05 (see page 44) and, in addition, runs faster and has improved support for asynchronous communications. $40. Δ A new disk drive that reads both sides of a double density disk. $650. Δ Two additional business programs from **BPI Systems**—*Inventory Control* and *Accounts Receivable*, each $425. Δ A Basic compiler will be available mid-July. $300. Δ There is a new software submissions policy that eliminates ceilings on royalties paid for newly submitted programs. Royalty terms will be decided individually for each program. Also, the "acceptance agreement" that must be signed before a program is considered has been simplified. Past recipients of submissions packets are automatically on the mailing list for the new plan. Programmers who currently have programs under evaluation may choose between the new plan and the old. Newcomers can get a copy of the new guidelines by writing IBM, External Submissions Department #765 PC, Armonk, NY 10504.

Δ The *Instor/801* is an 8" floppy disk system that allows the transfer of data between the pc and mainframe IBM computers. Produced by **Instor** (175 Jefferson Drive, Menlo Park, CA 94025; 415-326-9830). $2,000.

Δ *Desktop/Plan* allows the user to create a financial model simply by selecting items from a series of menus. The program includes a hi-res graphing feature and can use color if an appropriate monitor and adapter are employed. A product of **VisiCorp** (2895 Zanker Road, San Jose, CA 95134; 408-946-9000). $300.

Δ **Escon Products** (12919 Alcosta Boulevard, San Ramon, CA 94583; 415-820-1256) produces an interface that allows you to use an Olivetti 121 or 221, or any IBM typewriter, as a printer. $465. Cable $25.

Δ *MBA* is a program designed for businessmen with no computer experience. It includes a spreadsheet with graph generator, a database, and a word processor, all controlled by the same set of commands. From **Context Management Systems** (23864 Hawthorne Boulevard, Torrance, CA 90505; 213-378-8277). $695.

Δ **Tecmar** (23600 Mercantile Road, Cleveland, OH 44122; 216-464-7410) offers a line of hardware add-ons. Expansion chassis with eight slots. $945. Δ 5M Winchester hard disk (includes chassis). $2,995. Δ 10M Winchester disk (includes chassis). $3,995. ΔRAM boards: 64K, $495; 128K, $749; 192K, $995; 256K, $1,295. Δ *Scribe Tender*, a board that includes two parallel ports and one serial port and fits into a single slot, allowing you to run several devices at the same time. $195. Δ *Time Master*, a clock and calendar giving any time from the month to the thousandth of a second. Has a battery backup. $99. Δ *Device Master*, which combines *Time Master* with a controller to turn lights and appliances off and on. $229. Δ A two-axis motor controller for industrial control or robotics. $495. Δ *Speech Master*, a speech synthesizer with a built-in vocabulary of 143 words. $395. Δ An IEEE-488 interface for use with industrial equipment and test devices. $395. Δ A fused extender board to interface with an oscilloscope or logic analyzer. $80.

Δ **Sycon** (3040 Scott Boulevard, Santa Clara, CA 95050; 408-727-2751) offers *The Phone Chronicle*, a hardware and software package that logs phone calls. Single line, $395; four line, $695.

Δ **Symtec** (15933 West 8 Mile, Detroit, MI 48235; 313-272-2950) produces a light pencil that can operate in either hi-res or lo-res mode. $150.

Δ *V-Utility* is a package of four programs for use with *VisiCalc*. *V-Print* assists in formatting for a printer. *V-Stat* collects data automatically from a *VisiCalc* column and performs statistical analyses. *V-Plot* graphs either one or two *VisiCalc* columns on a regular line printer. *V-Overlay* provides a selection of overlays to load to the *VisiCalc* sheet. Product of **Yucaipa Software** (12343 Twelfth Street, Yucaipa, CA 92339; 714-797-6331). $99.95. Individual programs are available separately for $39.95.

Δ **Basic Business Software** (Box 26311, Las Vegas, NV 89126; 702-876-9493) has released nine packages for the pc. *Some Common Basic Programs* includes seventy-six short programs for business, school, and home. $35. Δ *Finance Calculator* computes the return on investments. $30. Δ *Plot* produces graphs from raw data. $75. Δ *Statistics* is a package of twenty-four short statistical programs. $75. Δ *Amortization & Depreciation*, as you would expect, computes amortization and depreciation. $30. Δ *IBM Basic Utilities* is a package of subroutines for programmers. $75. Δ *Fixed Asset Depreciation System* calculates depreciation for accounting and tax purposes. $245. Δ *Ultra-Basic Translator* will translate high-level Basic programs into IBM Disk Basic. $75. Δ *Star Programming System* is a program generator for data processing. $445.

Δ *Qunix* is an operating system resembling Unix. It allows multitasking and up to eight users. There is also a single-user version that requires two floppy drives. $150. A two-user version requiring two floppy drives. $200. A four-user version requiring 128K and a 5M Winchester hard disk. $250. An eight-user version that requires 256K and a 5M Winchester disk. $300. Δ A series of programs: an 8086 assembler ($100), a C compiler ($350), a full screen editor ($125), a text formatter ($125), and a Basic compiler ($125). Produced by **Quantum Software Systems** (7219 Shea Court, San Jose, CA 95139; 408-629-9402).

Δ **Software Products International** (10343 Roselle Street, San Diego, CA 92121; 714-450-1526) has announced a line of business programs that run in UCSD Pascal or MT Plus Pascal. *LogiCalc* is a spreadsheet program. $290. Δ *LogiQuest III* is a relational database, compatible with *LogiCalc*. $690. Δ *Asset Package* includes these programs: *General Ledger*, *Accounts Payable*, and *Accounts Receivable*. $1,290.

Δ *The Programmer* is a menu-based program generator from **Advanced Operating Systems** (450 Saint John Road, Michigan City, IN 46360; 219-879-4693). Using only single keystrokes, a novice computer user can produce, for example, a customized accounting system or a database. Two disk drives required. $495.

Δ **Professional Micro Systems** (4000 MacArthur Boulevard, Newport Beach, CA 92660; 714-851-8655) has a 20M Winchester hard disk system that replaces a floppy disk drive in the system unit. $5,995. There are also a number of programs available with the

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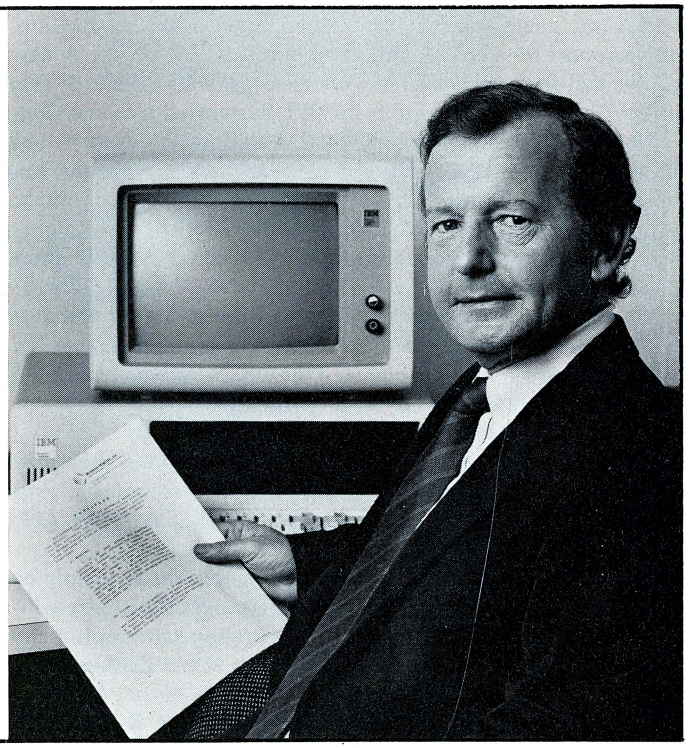

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system. Δ *WordStar* is a word processing program. $495. Δ *SuperCalc* is a spreadsheet which, in this version, allows the user access to 512K bytes of memory. $295. Δ *Accountant's Client Write-up* is a general ledger program suitable for preparing financial reports. $1,000. Δ *Accounting Plus* is an accounting package, featuring accounts payable, accounts receivable, payroll, purchasing, inventory control, and general ledger. $3,525. Δ *1-DOS* is a disk operating system that allows CP/M-86 programs to run without additional hardware. $295.

Δ *Record Management System* is a machine language database designed for people who are not computer experts. From **Washington Computer Services** (3028 Silvern Lane, Bellingham, WA 98226; 206-734-8248). Also available to run in CP/M-86. $395.

Δ *Agenda* is a personal calendar program from **TCI Software** (6107 West Road, Flourtown, PA 19031; 215-836-1406). $65. Δ *Mailtrack* is an address and phone number program, equally able to produce mailing labels or phone directories or to act as a reference. $65.

Δ *Real Estate Investor* by **Simple Soft** (480 Eagle Drive, Elk Grove, IL 60007; 312-364-0752) is a real estate planning tool designed for novice computer users. The program calculates such things as mortgage payments, taxes, depreciation, and investment return. *Real Estate Investor* is part of the Quickcalc line of financial programs, designed for use with *VisiCalc*. $99.95.

Δ *Easy Data* is a database program designed for people who are new to computers. Requires two disk drives. Product of **Norell Data Systems** (3400 Wilshire Boulevard, Los Angeles, CA 90010; 213-257-2026). $250.

Δ *Insoft Accountant* is an accounting system in four packages: *General Ledger*, including a balance sheet and income statement; *Accounts Receivable*, with automatic billing; *Accounts Payable*, which can print checks; and *Payroll*, which can be used to print paychecks and keep personnel information. Requires two drives or hard disk, and a 132-column printer. Produced by **Insoft** (10175 SW Barbur Boulevard, Portland, OR 97219; 503-244-4181). $365.

Δ **Datamac** (680 Almanor Avenue, Sunnyvale, CA 94086; 408-735-0323) offers Winchester hard disk drives: 6M, $2,995; 12M $3,495; and 18M, $4,195. The disk controller is available separately for $1,950. Δ Asynchronous communications card: Single line, $139; double line, $199. RAM boards from 64K ($449) to 256K, ($1,035).

Δ *Milestone* is a project-management and time-scheduling program from **Digital Marketing** (2670 Cherry Lane, Walnut Creek, CA 94596; 415-938-2880). Requires CP/M-86 or UCSD p-System. $395. Δ *DateBook II* is an appointment book program for doctors, dentists, and lawyers. Requires CP/M-86 or UCSD p-System. $295. Δ *Textwriter III* is a text formatter that can be used with *EasyWriter* or another word processor to produce such things as indexed and footnoted manuals and personalized form letters. Requires 32K. $125.

Δ **Davong Systems** (1061 Terra Bella Avenue, Mountain View, CA 94043; 415-965-7130) has announced a 5M Winchester disk system that can be installed in a system unit in place of a floppy disk drive. $1,995. Δ A two-channel asynchronous communications card that can emulate a dumb terminal. $199 Δ A 64K RAM board, $395; 192K, $845; 256K, $1,075.

Δ *Level II Cobol* is a mainframe-compatible compiler that runs with 128K, two disk drives, and CP/M-86. $1,600. Δ *Cobol Animator*, for use with *Level II Cobol*, is a utility that "animates" a program by displaying its source code and moving the cursor from statement to statement during program execution. $800. Δ *Forms-2* is a screen formatter for Cobol. $200. All from **Micro Focus** (1601 Civic Center Drive, Santa Clara, CA 95050; 408-496-0176).

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Δ **Chrislin Industries** (31352 Via Colinas, Westlake Village, CA 91362; 213-991-2254) offers a number of RAM expansion boards. Top of the line: 256K. $895.

Δ **Electronic Specialists** (171 South Main Street, Natick, MA 01760; 617-655-1532) has a line of isolator plugs to protect your machine from current surges: two plugs, $96.95, three plugs, $104.95, two isolated banks of three plugs each, $104.95, remote switched isolators, $79.95 up.

Δ *Spellguard*, a proofreading program with a 20,000-word dictionary, is available from **Innovative Software Applications** (1150 Chestnut Lane, Menlo Park, CA 94025; 415-326-0805). Also available in CP/M-86. $295. Δ British dictionary for *Spellguard*. $125.

Δ **Santa Clara Systems** (560 Division Street, Campbell, CA 95008; 408-374-6972) offers hard disk storage with CP/M-86. 5M, $3,495; 10M, $3,995; floppy backup $550 extra. Δ Also available: a 10-40M fixed disk system with removable 10M Winchester backup. $7,310 in 10M configuration.

Δ **Seattle Computer** (1114 Industry Drive, Seattle, WA 98188; 206-575-1830) has a line of memory expansion boards with RS-232 serial ports: 64K, $475; 128K, $675; 192K, $875; 256K, $1,075. 64K chip kits that allow the user to double the capacity of the 64K boards. $200.

Δ *Index Sequential Access Method* is a filing program from **Johnson Associates** (Box 3069, Redding, CA 96049; 916-221-0740). Requires 16K of memory. $90.

Δ Proto boards, for those who like to produce their own hardware, are available from **Legend Industries** (Box 112, Pontiac, MI 48056; 313-674-0953). $39.95.

Δ **Corvus Systems** (2029 O'Toole Avenue, San Jose, CA 95131; 408-946-7700) has a line of Winchester hard disks: 6M, $3,195; 11M, $4,995; 20M, $5,995. Δ *Corvus Mirror* is a 100M tape backup for the Winchester disk. $790.

Δ The *HP7470* is a two-color hi-res plotter produced by **Hewlett-Packard** (3000 Hanover Street, Palo Alto, CA 94304; 415-857-1501). $1,550.

Δ *Write-On!* is a word processor from **DataMost** (9748 Cozycroft Street, Chatsworth, CA 91311; 213-709-1202). $129.95.

Δ *Big Four* is a package of four accounting programs: accounts payable, accounts receivable, general ledger, and payroll. Requires two disk drives and a 132-column printer. A product of **TCS Software** (3209 Fondren Road, Houston, TX 77063; 713-977-7505).

Δ **IBM** is authorizing sixty-two new dealerships in forty-three cities. The new outlets join the existing Computerlands, IBM Product Centers, and Sears Business Systems Centers in retailing the Personal Computer. Δ New from IBM: *Typing Tutor*, a program useful for individuals as well as classroom instruction. $30. Δ *Fact Track* helps children to practice arithmetic. $90.

Δ **Automated Simulations** (Box 4232, Mountain View, CA 94040; 415-964-8021) has announced the conversion of its award-winning graphics adventure *Temple of Apshai* to the pc. The game has been adapted for the IBM keyboard and features more detailed graphics than the earlier versions. Requires color adapter. $39.95.

Δ **Information Unlimited Software** (281 Arlington Avenue, Berkeley, CA 94707; 415-525-9452) has released *EasyWriter II*, a word processor not to be confused with the *EasyWriter* designed by IUS and marketed by IBM. Two disk drives recommended. $350.

Δ **Info-Pros** (2102 Business Center Drive, Irvine, CA 92715; 714-851-8975) sells *Galaxy Master*, a simple, shoot-'em-up space game. Requires eighty-column screen. $29.95.

Δ *Select Word Processor* includes a self-instruction routine to teach the user to operate the program. Requires 48K and two drives. Also available in CP/M-86. Produced by **Select Information Systems** (919 Sir Francis Drake Boulevard, Kentfield, CA 94904; 415-459-4003). $595.

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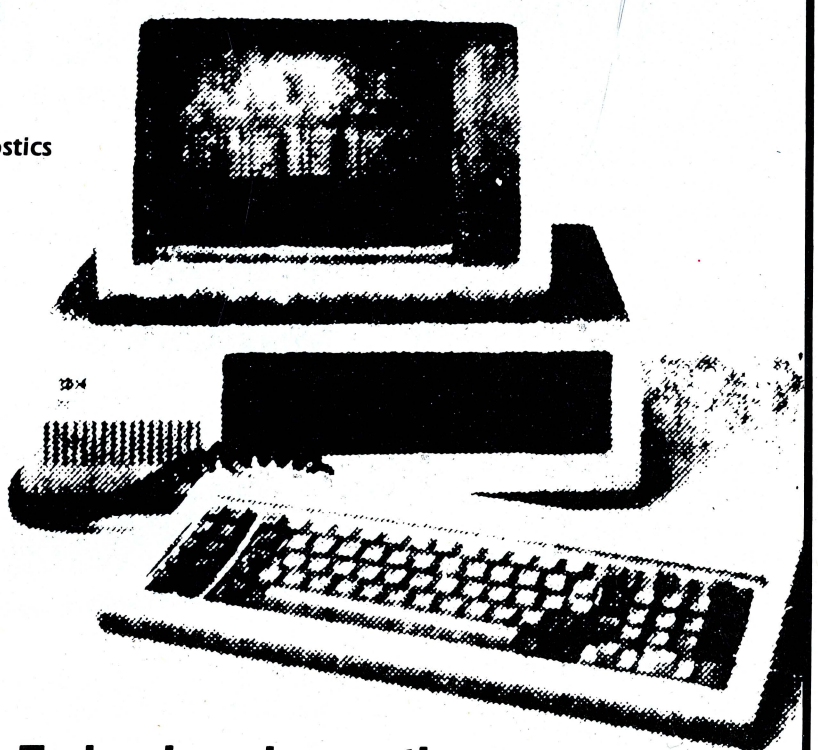

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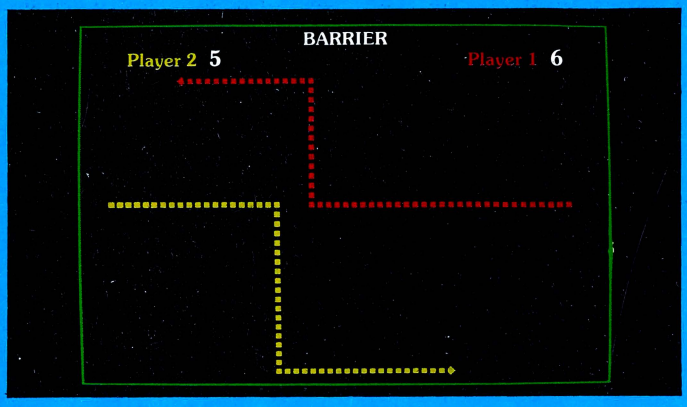
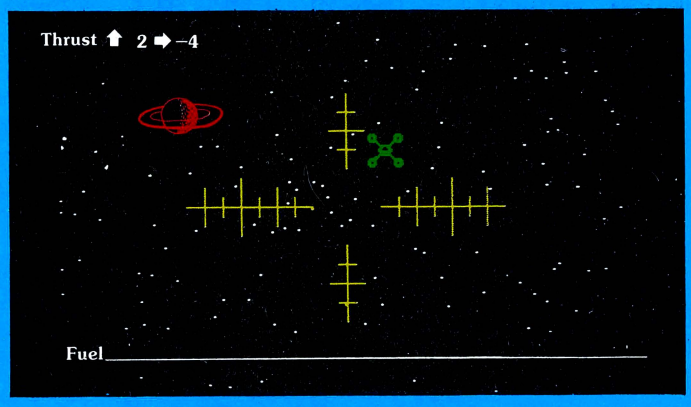
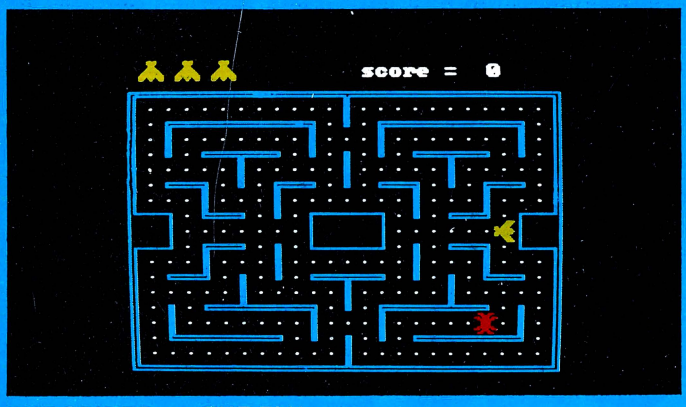


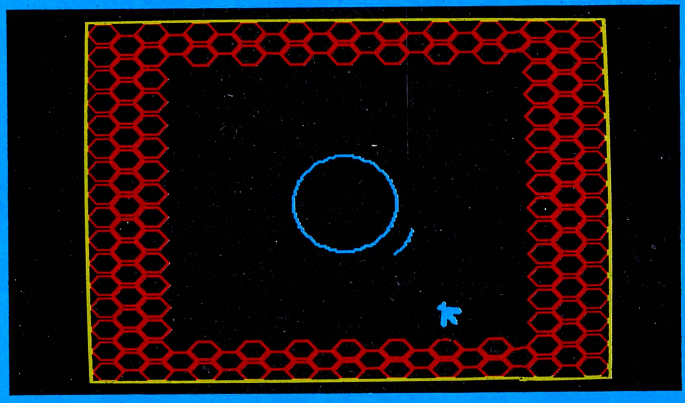
BARRIER: PIT YOUR SKILLS AGAINST A FRIEND. EACH PLAYER ATTEMPTS TO CAPTURE AS MUCH OF THE SCREEN AREA AS HE CAN. BY USING THE KEYBOARD EACH PLAYER POSITIONS HIS BARRIER STRATEGICALLY IF YOU RUN INTO THE BOUNDARIES OR THE OTHER PLAYER YOU LOSE.



STAR CHASE: IMAGINE THAT YOU ARE THE CAPTAIN OF A STAR SHIP WITH THE MISSION TO SEARCH AND DESTROY ALEIN VESSELS IN OUTER SPACE. THE RATING THAT YOU RECEIVE AS A RESULT OF THIS MISSION DEPENDS UPON YOUR SKILL AS A INTERSTELLAR PILOT.



THE SPIDER AND THE FLY: YOU CONTROL THE FLY THAT IS CAUGHT IN THE MAZE OF THE SPIDER. CAN YOU TRAVERSE THE MAZE AND COLLECT ALL OF THE DOTS BEFORE THE SPIDER CATCHES UP TO YOU? THE HERO OF THE GAME IS THE ONE WHO CAN COLLECT THE MOST DOTS BEFORE THE SPIDER CONSUMES THE FOUR FLYS.



HONEYCOMB: THE SCREEN IS BORDERED BY HONEYCOMB CELLS THAT TRAP A KILLER BEE. AT THE CENTER IS A PADDLE THAT MUST BE USED TO REFLECT THE BEE'S STRIKES. IF ALL OF THE CELLS ARE DESTROYED BEFORE THE BEE STINGS YOU 5 TIMES, YOU WIN!!

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Δ The latest games from **Infocom** (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031): *Deadline*, an elaborate whodunit text adventure game. $49.95. *Zork II*, in which your character must deal with the demented Wizard of Frobozz. $39.95.

Δ **Que Corporation** (6515 East 82nd Street, Indianapolis, IN 46250; 317-842-7162) has published *IBM's Personal Computer*, an easy-to-read introductory book complete with evaluations and reference material. $14.95.

Δ **MicroPro** (1299 Fourth Street, San Rafael, CA 94901; 415-457-8990) has converted its popular word processor, *WordStar*, for PC-DOS. Two disk drives recommended. $495. Δ *MailMerge* is a file merging program for use with *WordStar* that can be used to produce customized form letters. $150.

Δ *Compucube* from **Stoneware** (50 Belvedere Street, San Rafael, CA 94901; 415-454-6500) will solve your Rubik's Cube for you or just let you play. Requires 48K and graphics board. $29.95.

Δ **Beaman Porter** (Pleasant Ridge Road, Harrison, NY 10528; 914-967-3504) offers *PowerText*, a word processor that can accommodate 200K bytes per disk and comes with a five-year warranty. Requires two disk drives. $399.

Δ **Electronic Data Systems** (7171 Forest Lane, Dallas, TX 75230; 214-934-5900) markets *The Communicator*, a program that allows a pc to talk to any Bell 103 compatible system, including the Apple II. The program can transfer *VisiCalc* files, manipulate data, and send or receive directly to disk. Modem required. $180.

Δ A joystick for the pc is available from **TG Products** (1104 Summit Avenue, Suite 106, Plano, TX 75074; 214-424-8568). $64.95.

Δ *Home Accountant Plus* is a program with room for 100 budget categories, five checking accounts, and credit cards. It also has a financial planning module. A product of **Continental Software** (11223 Hindry, Los Angeles, CA 90045; 213-417-8031). Supports parallel printer only. $150.

Δ **Avant-Garde Creations** (Box 30160, Eugene, OR 97403; 503-345-3043) will sponsor a programming workshop August 8-14 in Eugene, OR. Bring your own computer.

Δ **Lifeboat Associates** (1651 Third Avenue, New York, NY 10028; 212-860-0300) offers a CP/M-86 emulator that runs on PC-DOS. $75.

Δ *PC/Forth* is a program development system including an interpreter/compiler, editor, assembler, reverse translator, and utilities. $100. Δ Nautilus Cross Compiler allows the creation of dedicated disk- or ROM-based programs. Requires *PC/Forth*. $300. Both from **Laboratory Microsystems** (4147 Beethoven Street, Los Angeles, CA 90066; 213-306-7412).

Δ *FMSII* stands for Financial Management System II, a program that maintains multiple accounts, prints reports, does audits, and prints checks. From **Computerized Management Systems** (1039 Cadiz Drive, Simi, CA 93065; 805-526-0151). $89.95.

Δ **Microcorp** (913 Walnut Street, Philadelphia, PA 19107; 215-627-7997) publishes *Unbasic*, an extended Basic preprocessor. $75. Δ *Intelliterm*, a communications program governed by single keystrokes. $150. Δ *Datamaster*, a database management system. $800. Δ *Viewdisk*, a disk exploration program with graphics. $20. Δ *Recover*, a program that recovers erased files. $20. Δ *Superzap*, which can view and modify any byte on a PC-DOS disk. $40. Δ *8088 Assembler*, an assembler written in *Unbasic*. $75.

Δ **Gary Irwin & Associates** (4102 Williwaw Drive, Irvine, CA 92714; 714-552-1004) produces *ASCII Terminal Simulation*, which allows a pc to function as an ASCII terminal. Requires asynchronous communications adapter and Pascal. $250. Δ *Metagames*, a package of four games written in Basic, with source code and documentation to teach game programming. Requires color adapter. $125. Δ *IBM DOS Indexed Access Support* is a utility file system. $75. Δ

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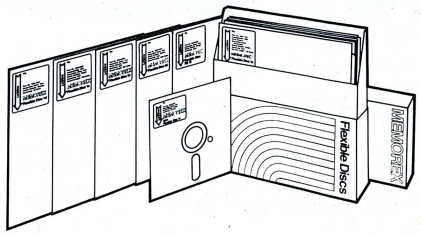

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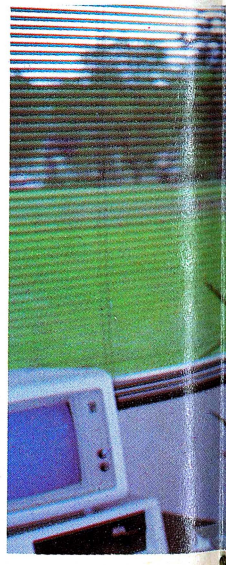


In Kansas and Missouri They Bank on Their PCs

Small banks get big bank service from the Personal Computer

by Allan Tommervik

Think of a business where recession is not a problem.

Think of a business where inflation is not a problem.

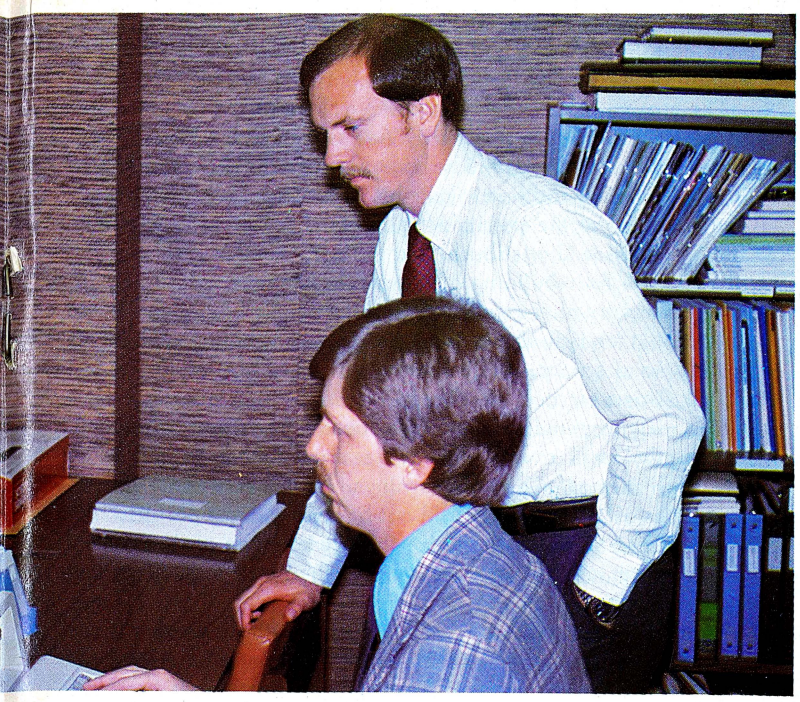
Think of a business where cash flow is not a problem.

If your answer to one or more of the above was banking, you win a prize for conventional thinking.

In popular myth, your local banker's only problem is having enough fingers and toes to count his money and his golf handicap.

After all, when money is loose, he's got plenty to lend. When money is tight, he just jacks the interest rate to keep that old cash flow stable. Besides, he's got all the money in the first place, how can money be his problem?

The more aware readers may hearken back to the failure of New York's Franklin Bank in the seventies, then the nineteenth largest in the country, and realize dimly that somehow bankers have some of



ank of Olathe officers Mike Millikan (standing) and Mike Major use Gary Robben's rogram. Left: Gary Robben & Associates director Larry Geiger (l), who originally al Computer, stands beside president and founder Gary Robben. Below: Programmer Robben & Associates's Missouri office.

the same trials and tribulations of other businessmen.

But it's hard to hold that thought for more than a few seconds against the realization that the banker is the fellow you go to, hat in hand and on bended knee, for money of all kinds—lines of credit or receivables financing for your business as well as credit cards, personal loans, or mortgages in your personal life.

The banker always has the money and you always covet it. How can he have a problem?

Bankers Are Just Folks, Too. As always, reality disputes the conventional wisdom. Bankers must face economic facts of life no less than automobile manufacturers, dry goods purveyors, or software publishers.

And the presently volatile nature of some of the elements that bankers must deal with has made their task even more difficult. The economic fundamentals have changed more in the past few years for bankers than in the previous few decades.

It was the advent of the consumer money market in the form of 182-day money market certificates with their rate tied to Treasury bills that heralded this change. All of a sudden, the banker was paying out higher rates of interest than ever before, often without recognizing the ramifications this had on other areas of his business.

What some bankers found themselves trying to do was pay 13 percent on deposits while receiving 5 percent from long-term investments. It takes neither an economic savant nor a mathematical wizard to recognize that something's out of kilter in a situation like that.

The difference between the rates of interest a bank is paying and the rates of interest a bank is receiving is known as the *gap*. A negative gap is enough to turn the nicest banker into an ulcer-ridden misanthrope.

The realization that there were hidden implications for the gap in these influxes of deposits caused bankers to turn to asset/liability management to help ward off such potentially unpleasant aftereffects.

For big banks with lots of bucks and a big data processing department, plugging asset/liability management techniques into their systems was merely a matter of applying some programming effort and computer time to the problem.

But what about the small and middle-size banks? How could they monitor the gap and take corrective action as needed to keep their cash flow positive?

A Good Scrubbing. There are now several programs offered to assist bankers in that worthy effort, but none is more innovative or effective than the one offered by Gary Robben & Associates of suburban Kansas City. They've drafted the IBM Personal Computer into the service of the banks with most salutary results.

The confluence of forces that brought Robben, banks, asset/liability management, and pc together is a serendipitous one; and therein, of course, lies the tale.

Gary Robben is one of those clear-eyed, clear-thinking Midwesterners who are the favored recruiting objects of Fortune 500 companies when they graduate from college. There's something about the sons and daughters of the Midwest that makes them prime candidates for management trainee positions. Perhaps it's fighting the vicissitudes of cold winters and hot summers. Perhaps it's their closeness to the soil. Whatever the reason, management recruiters believe that growing up in the Midwest builds strong character twelve ways.

So it was with Robben, who was recruited by Arthur Andersen & Company when he graduated from Kansas State University. Andersen is one of the biggest of the big eight accounting firms that span the accounting profession like colossi, pursuing only the creme de la creme of each year's graduates.

Robben lived up to the promise Andersen had perceived, earning his certified public accountant stripes and rising to a department managership. The quality of his service was such that when, in 1971, the Securities Exchange Commission demanded full audits of all the bank holding companies, Andersen selected Robben among those thrown into the breach to meet the increased auditing demands.

Seeding the Dream Clouds. It was there that Robben got his first serious introduction to the banking business, and it was there that a dream was born: perhaps someday he would buy his own bank.

As is often the case with those destined to be movers and shakers, someday was not far off. In 1976, Robben invested in a small bank in Rock Port, Missouri. Two years later, he bought the bank in Elmo, Missouri. If the names of these communities aren't familiar, don't start thinking your sixth-grade geography teacher

was guilty of neglecting your education. Together, the two towns would barely make a modest-sized suburb.

Nevertheless, opportunity is where you find it, and Robben seized that sucker by the throat with an iron grip. He's more than doubled the size of the bank in Rock Port and nearly doubled the assets of the one in Elmo.

But Dame Fortune is a fickle lady who continues to test even those graced with her blessing. In Robben's case, even after he left Andersen in 1976 to tend full time to his Rock Port investment, he wasn't free to move to Rock Port because his wife had a continuing teaching commitment in the Kansas City area.

Robben commuted often to Rock Port, but on those days when he stayed in Kansas City he began getting calls from banks with whom he'd worked when he was with Arthur Andersen. Eventually, he took on the First National Bank of Olathe, Kansas, as a client, and that became the seed from whence Gary Robben & Associates sprang.

In early 1977 Robben had attended a bank management clinic, and several more potential clients evolved from introductions at that seminar. It's a measure of the difficulty of managing a bank that these folks started beating down Robben's door.

And who better? Here was one of their own who also had the financial expertise to set them back on the straight and narrow. So you have to sympathize some with Robben for not being able to resist the importunings of the banks. After all, how can you match a business that has banks for clients? At least you should never have to worry about collecting your fees.

Clash of Desires. It soon became manifest that Robben could not be both a full-time banker in Rock Port and continue to consult with other bankers. So he set aside the yearning to be an on-site bank manager to concentrate on his bank advising duties.

This decision led to his hiring of Larry Geiger, another CPA and a former associate at Andersen whose strength lay in the areas of data processing but who had the uncommon programmer's talent of communicating well with the layman.

The growth of Gary Robben & Associates from that time forth was nothing short of meteoric. By August, he added his next employees. By February of 1978 he had outgrown the offices he shared with another CPA and had to take his own office space. Eventually Robben bowed to the inevitable, purchased 5.6 acres in Merriam, Kansas, a Kansas City suburb, and built the first module of what will become a four-building office development.

The company now employs thirty-one people with plans to add an additional ten before this quarter ends. Client billings, which are the measure of an accountant's success, reached one million dollars in 1980. This year that merely represents the first quarter.

The early impetus for signing Robben up as financial consultant was the small country banker's realization that he had to get more sophisticated about his earnings. In those ancient, slower-paced times of 1977, bankers did not have an interest problem; but they were beginning to recognize that their return on investment was not matching their expectations or the returns of other successful industries.

Local Boy Makes Good. What Robben brought to his clients was a complete understanding of their situation because he was one of them. He immediately converted each of his clients from a cash accounting system to accrual accounting and shifted the banker's emphasis from the balance sheet to the profit and loss statement.

Robben introduced good accounting and good budgeting techniques to a group of businessmen unused to such fundamentals. By forcing them to manage by objectives, Robben focused his clients' attention more sharply on the revenue and cost areas of their business. The results were so beneficial that soon Robben needed to add tax planning to his laundry list of services.

While Gary Robben & Associates were bringing their first clients up to state-of-the-art in accounting practices, forces were being loosed that would shake the fundamentals of banking.

In 1978, the federal government was casting about for more places to borrow money. Their competition for funds in the esoteric money markets of the time was driving up the borrowing costs for private borrowers or drying up the fund altogether. In addition, the small savers were chafing at the sight of the wealthy raking in high interest rates for lending to the government while they were shut out from similar bonanzas.

There clearly wasn't enough money to go around, and there's no one more ingenious than the bureaucrat whose job is threatened. If the government couldn't tap enough funds to keep the coffers full, that had clear and negative implications for the bureaucracy. So they came up with a plan to tap this new mother lode of small savers by making available 182-day money market certificates in smaller denominations at relatively high and competitive interest rates.

Run for the Money. Banks apparently never had it so good. What became popularly known as T-bills became the currency of the small saver, and whole strategies were built up around how to extract the highest interest rates for their savings. Savers who hadn't darkened a bank door in years all of a sudden couldn't be beaten off with a stick. Deposits flowed into banks and everyone knows that deposits mean profits if you're a banker. Except that the ground rules had changed.

In the days of yore, savers clung to their deposits with a tenacity unrivalled since the Seven Blocks of Granite conducted goal line stands for Fordham in the thirties. This stability allowed bankers to make adjustments to their assets leisurely, since their interest costs could be predicted for months and even years in advance.

But the onslaught of new deposits also brought a volatility to the bankers' liabilities. First, a new interest rate was announced each Tuesday morning. Each Tuesday the banker found himself with a new cost to contend with.

Second, additional varieties of money market certificates were introduced, ranging from ninety-one day to thirty-month certificates. Each carried its own interest rate.

Finally, savers were no longer content to let their savings ride at whatever interest rate. If they saw an economic advantage they grabbed it, which meant they were willing to take penalties on prior deposits to convert to higher-paying savings.

All this came in a bewildering rush that caught most small and medium-size banks defenseless. Some had no installed method of keeping track of rate-sensitive items. Others kept track, but on different systems for different functions, which precluded an easy method of comparing and getting good management reports.

Parting the Green Sea. The real crux of the problem was that interest is the place where banks make or lose money. The noninterest expenses of a bank always exceed the noninterest income. Clearly, banks needed to keep the gap between the interest they were receiving and the interest they were paying large enough to provide for profit.

Under these conditions, asset/liability management became the buzzword in the banking community. Asset/liability management focuses on rate-sensitive items, both assets and liabilities, to ensure a proper balance.

But in these volatile times, with the rates of interest being paid changing so rapidly, it was a lot easier said than done to accumulate the right management information to ensure a proper gap that would keep margins stable.

Such problems did not escape Robben, who began casting about for a better way to provide management with good visibility of their cost of doing business so they could adjust their business plans accordingly.

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Simultaneously, Bob Colvin, a Kansas City bond broker who handled many bank clients, was recognizing similar problems. His clients were holding low-return bonds while paying out higher rates of interest on the new T-bills. Colvin wasn't in a good position to advise his clients properly because he couldn't get a good fix on what returns they needed.

Colvin and Robben compared notes, each expressing frustration over the difficulty of giving the smaller banks good advice.

No Small Potatoes. It should be noted here that the term smaller banks applies to those with less than one hundred fifty million dollars in assets. Now, one hundred fifty million is not a number most of us usually associate with small, particularly not when the number describes dollars. But such are the realities of the banking business.

Gary Robben at his desk.

Colvin set out resolutely to come to the aid of his banker clients. For a design team, he enlisted Bill Stolzer, a Manhattanite; Kansas banker Al Beuchian, a fellow bond broker; and Pat McGee. They began planning a program that would allow these smaller banks to have better visibility of their interest liabilities.

Pat McGee, as president of a small bank, recognized the need for such an effort. His wife, Sylvia, most fortuitously, had a business programming background. She set for herself the task of translating the requirements communicated to her by the design group into a program that would run on a TRS-80 Model II.

The program was first tested at a Burns, Kansas, bank where Pat McGee served as a director. Bank data was delivered to Sylvia, who would key it in, generate the reports, and send the reports back to the bank. The program generated lots of interest, but only a few more sales.

But most of the banks would ask, "What does Gary Robben think of it?" Back went Colvin to Robben to show him the program as it had evolved. Robben installed it in his Rock Port bank to test it for himself.

Robben was critical on two essential features of the program. First, he did not feel it developed enough information for bank management. Second, he was restive about the two-week lag between sending the data to be input and the receipt of the reports. But he saw great promises in the embryonic system.

Personal Best. During this time, IBM announced and released its Personal Computer. Robben was of the firm opinion that the microcomputer doing the data processing should be on-site at the bank to cut the turn-around time from input to report. He asked Geiger, who by now was serving as director of firm operations as well as resident data processing guru, to recommend the best microcomputer for the task, and Geiger resonded with a recommendation that the Personal Computer be the core unit.

Geiger's choice was based largely on the sixteen-bit architecture of the system and its self-diagnostic routines that would prevent a failing chip from polluting the data. Geiger was most concerned with reliability. As a CPA himself, he recognized that bad data was even worse than no data at all.

Also during this time, conversations resulted in Robben and Colvin joining forces. Robben redesigned the reports and Sylvia McGee began the task of translating the program from the TRS-80 to the pc.

In Robben's redesigned system, each rate-sensitive item was entered individually rather than averaged with all rate-sensitive transactions of like kind. The program was formatted to balance with the general ledger, and data entry and reporting occurred on a daily basis.

In most banks of the size this system was designed for, data entry is less than a two-hour task; but even if the time were double that amount it would be trivial compared to the reports the program generates.

Megafact Micros. Robben and Colvin did not settle for micro reports on their microcomputer. The system they configured was a 64K pc with two disk drives and an Epson 100 printer for 132-column printout. They use every bit of that capability to produce a plethora of management information.

The six standard reports generated by the system give bank managers clear and complete visibility of their asset/liability ratio. The daily report serves basically as a snapshot of the bank's activities at a given point in time.

It breaks out all rate-sensitive items by category with their average rate of interest. Rate-sensitive assets and other earning assets are totalled separately, and other assets are enumerated.

Rate-sensitive liabilities are also listed by category and then totalled separately from other liabilities. Non-rate-sensitive liabilities are then enumerated and the two categories combined to list the total cost of funds to the bank. That number, when compared to the number for total earning assets, paints the critical picture in terms of gap analysis.

But the report continues on to list deposits, other liabilities, capital, and earnings so as to balance the assets and liabilities.

A summary of the interest-bearing assets versus interest-bearing liabilities is included to show the spread between them. An analysis of earning assets lays out the yield and cost of those assets to determine the net interest margin.

Till You Turn Blue. If that seems like a whole lot of information on one report, you should take a deep breath. There's still more. In columnar form, investments and time CDs are listed by month to give the banker a linear picture of his rate-sensitive items for the next forty-eight months.

The data shows where the bank has already been lax or prompt in correcting potential imbalances. A not uncommon occurrence is to find a bank that's taken in a half million dollars at high interest rates in a given month without taking any remedial steps on the investment side to cover the costs.

This columnar data gives the detailed information necessary to determine at a glance whether the bank has been responding well to the changes in interest rates.

Also included in the report package are a monthly report that itemizes rate-sensitive categories by week for a four-week period; a monthly analysis report that covers the next twelve months; a short-term summary that reports in increments of less than thirty days, thirty-one to ninety days, ninety-one to 180 days, 181 days to one year, and over one year; a long-term detail report that extends the bank's rate-sensitive items out by month over the next sixty months and then by year through the seventeenth year; and a long-

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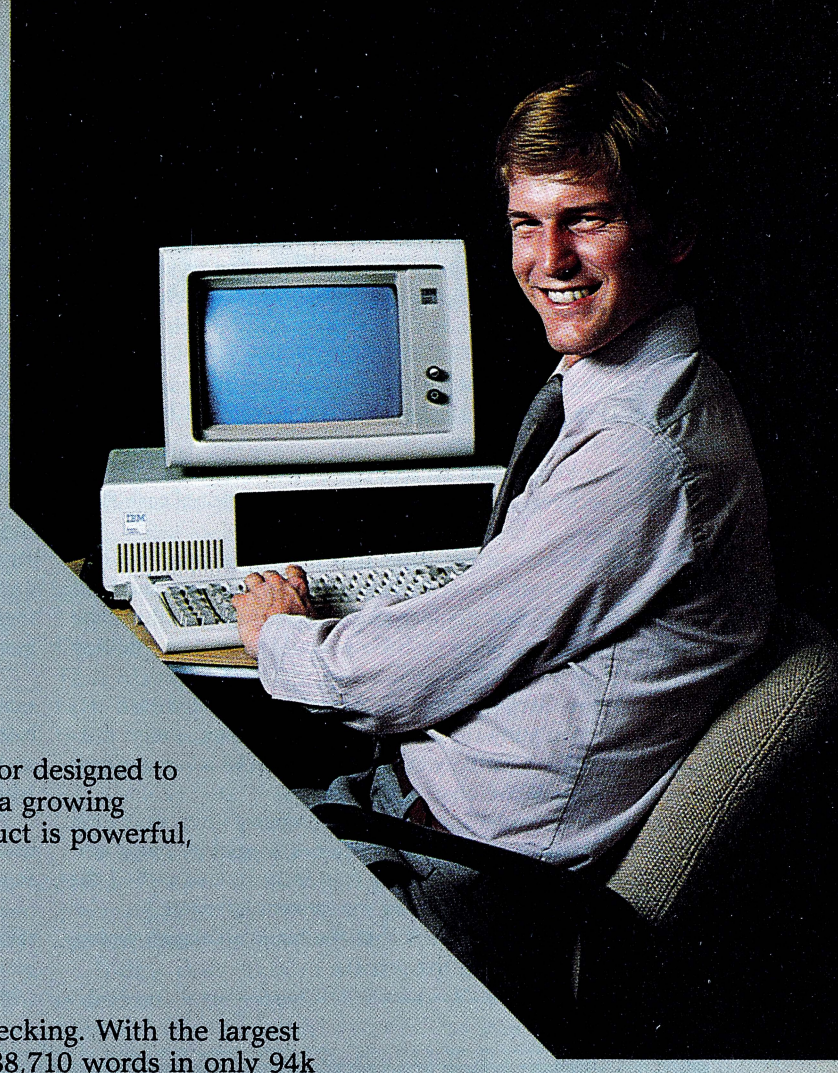

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term summary report that extends the results out over various yearly increments. All the reports are pegged to the balance sheet to ensure accuracy.

These reports cumulatively give the banker all the current information needed to respond aggressively and accurately to fluctuating interest rates.

Gary Robben & Associates also introduce their clients to the wonders of *VisiCalc*. The company was finding some resistance on the part of their clients to taking the losses on low-yield investments in order to free up funds for higher-paying assets.

Assets and Models. A *VisiCalc* template was developed that clearly showed what the penalties for early cashing in would be and what the new cash flow would be after the assets had been converted into higher investments.

Bankers using *VisiCalc* get an analysis of the loss, how long the loss will take to recover, and what the resulting additional cash flow will be.

A typical situation was the bank that needed to take nearly a million dollar bath to cash in its old, low-yield investments. But *VisiCalc* was able to show that the loss could be recouped within nine months and the resulting extra cash flow would exceed one million dollars.

Remember that Gary Robben & Associates are auditors, accountants, and consultants for banks, not software or system purveyors. While theirs is a turnkey system, they don't just arrange for delivery and then cash the check.

Before the system is ever installed, the company visits the buyer to pave the way. When the system becomes available, bank employees are given a one-week training session in its use and all the necessary preliminary data to set up the system is entered.

Finally, follow-up visits ensure that the bank managers understand and can effectively use the reports.

This is not a volume operation. By design, only four systems a week are installed to ensure a high level of training. When Sylvia McGee is not cogitating on programming enhancements to the system, she pitches in with Pat McGee, Bob Colvin, and several others in the training sessions.

As with Larry Geiger's original decision to adopt the pc because of its reliability in maintaining data integrity, so the rest of the staff exerts itself to ensure the integrity of the training and introductory periods so the installation will go smoothly.

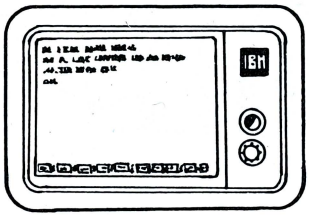
Winner Takes Olathe. One of the first installations was to Robben's first client, the First National Bank of Olathe. Vice president Mike Millikan and assistant vice president Mike Major are in charge of long-range planning, and they were looking for a tool to address the problem of asset/liability management. After looking at several minicomputer systems, they settled for Robben's pc.

As a well-run bank that had already benefited from Robben's consultation, they've been forced to make no dramatic policy or strategic shifts based on the data the pc provides them. But Millikan says it's helped them get a better handle on interest costs and mentions that the bank is contemplating forming an asset/liability management committee to better assess the reports.

The Olathe bank has designed its own forms that facilitate generating the data for the computer. Major, who has prime responsibility for operating the system, reports data entry only takes about an hour a day, and believes the system will be invaluable in judging when to adjust interest rates and when to bid on public money.

Both Mikes salute *VisiCalc* as an equally valuable tool. Whereas much of the budgeting function had been done by hand, they're now in the process of converting that function to *VisiCalc*.

In few places has the new pc been asked to work as hard and as reliably as it has in Kansas and Missouri. And it seems to be doing just fine. In fact, you can bank on it. Δ



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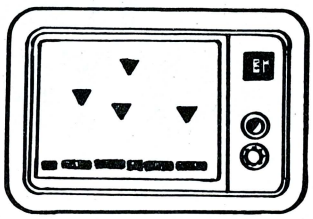


Unless otherwise indicated, software reviewed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive. Prices quoted for IBM products are retail at IBM Product Centers; elsewhere those prices may vary.

Microsoft Adventure. By Gordon Letwin. The player starts with the commands *Down. Down. South. Unlock Grate. In. West. Get Cage. West. Get Rod.* Soon you've proceeded to *Throw Axe*, and *Get Diamonds.* Eventually, you're likely to see "Oh dear, you seem to have gotten yourself killed. I might be able to help you out, but I've never really done this before. Do you want me to try to reincarnate you?"

This is Microsoft's 32K version of the original *Adventure*—a program developed on a mainframe computer in the seventies by Will Crowther and Don Woods. *Adventure* has had a thousand spin-offs, but the IBM release preserves the simplicity of the original. The game is a puzzle described entirely in text. There is no graphics, no color, no sound. *Adventure* doesn't run in real time—you can take as long as you like to think about each move. The character you control has no individuality and cannot be saved from game to game. The program understands only the simplest sentences; it doesn't even respond to the command *Get All.*

After all those negatives, what's left? Surprisingly, there's a lot. The simple, two-word, commands are quite adequate within the structure of the program. The locations in the game are arranged in logical order, though it's annoying that you occasionally enter a room from the east and find that the door is now to the southeast. "Colossal Cave," the scene of the adventure, is well described and almost spacious enough for a D&D campaign. It is well stocked with treasures, and with small, useful objects to help you with your quest.

There are also many dangers. A giant snake, a troll and a dragon all obstruct your footsteps. A vicious gang of dwarves—nasty, brutish, and short—practices knife throwing on your unarmored body. A kleptomaniac pirate keeps popping out of nowhere, stealing your treasure and hiding it in a bewildering maze. As if that weren't enough, your battery-powered lamp gets dim after a certain number of turns, and exploring Colossal Cave in the dark is suicide.

To enliven things, there are a number of magic words that enable you, for example, to teleport around the cave. Whimsically, Microsoft also included a Software Room, adjacent to the Soft Room in the cave; the "programmer" is the worst monster around!

Microsoft Adventure has survived the years well. It remains a good introduction to the adventure genre of computer games. **FJ**

Microsoft Adventure, by Gordon Letwin, IBM, (Box 1328C, Boca Raton, FL 33432; 305-998-2000). $30.

Zork I. By David Lebling and Marc Blank. In many ways, *Zork I* will seem familiar to those who have played *Microsoft Adventure.* Once again, you are a brave explorer wandering through a vast underground complex, gathering treasure and combating various threats.

The pesky dwarfs are gone, but the remaining monsters are nastier. There is a thief who keeps snatching your treasure and who's very hard to eliminate. The dimming electric lantern is just as troublesome as the one in *Adventure.*

However, this is a more sophisticated program than *Adventure.* The puzzles are more involved—to solve one, you often must solve a series of others. Actions in one part of the labyrinth will sometimes affect events elsewhere. Also, the program has a better understanding of English. Instead of saying "Kill troll," you can say "Kill the troll with the rusty knife. Drop the burned-out lantern. Go south," and each command will be executed in sequence.

Zork I is a classic. Without doubt, Infocom offers the finest text adventures yet available for the IBM. **FJ**

Zork I, by David Lebling and Marc Blank, Infocom (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031). $39.95.

Time Manager. By Dick Ainsworth, Al Baker, and Jeffrey P. Garbers. *Time Manager* is what you might call an intrapersonal electronic mail system. Its purpose is to relieve you of the burden of writing notes to yourself or tying string around your fingers. You can use it as a daily agenda planner, a list of feasts both fixed and movable, a small phone directory, and a simple accounting system.

When you boot the program you're asked first for the current date and time. You then find yourself looking at a calendar for the current month; days for which you have entered reminders to yourself are shown in reverse video.

Hitting enter takes you to the day level, where the entire screen is devoted to the memos of the day. Page keys change the screen from one day to another; you can also leap between nonconsecutive days by typing in the destination date.

Entries are organized by four parameters—priority, permanence, category, and text.

Time Manager recognizes five priority levels. Items marked as top priority follow you from day to day until you declare them done. Items in the other four priority classes remain bound to the day in which you entered them—unless you manually move them. One of the priority classes is for appointments at specific hours; the others can be used for items that aren't scheduled for any definite time of the day.

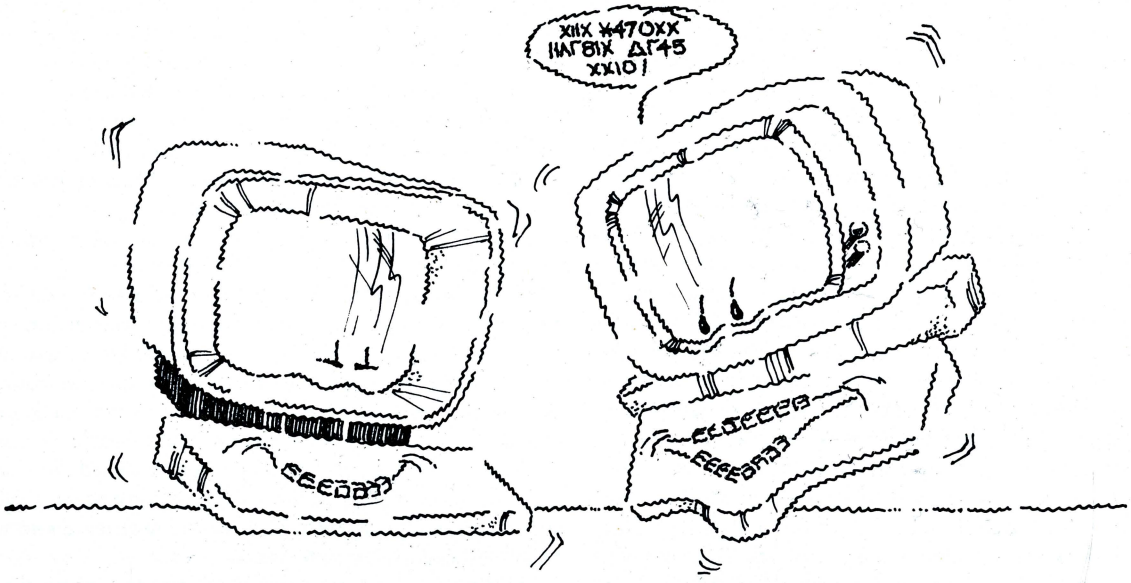
The permanence parameter allows you to designate holidays, birthdays, anniversaries, and such; when you've filled a data disk, the program's initialization procedure will transfer these permanent items to your next data disk.

The category parameter permits you to key items according to the type of activity they involve. Twenty-six categories are available, each identified by a letter of the alphabet. A two-stroke command displays a list of the categories as you've defined them; another simple command allows you to modify the list. Because the requirement that each category be designated by a different letter makes it awkward to come up with mnemonic identifiers, you'll probably need to consult your category list frequently—at least for a while.

The last parameter of an entry is the text of your reminder. *Time Manager* permits you to format data disks for either eighty-column or forty-column display. Normal entries will be limited to the capacity of a single line; you may run over that limit, but the program's search features will only operate on the first line of a multiple-line entry.

The search features let you specify either key words in your memo text or particular values of the other three parameters, and

"WHAT DID ONE COMPUTER SAY TO THE OTHER COMPUTER?"



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In its 'conversations' with other computers, The Communicator seldom runs into problems with passwords. Operating through the Hayes Stack Smartmodem, The Communicator features auto-dial, auto-answer, and an auto-logon that breezes through multi-layers of security and passwords.

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then scan through your files to find entries that meet your criteria. Multiple search criteria are allowed, so you may, for example, scan for priority-two entries of category Q that contain the word *promotion*.

Time Manager has a couple of ancillary functions in addition to posting your agenda. You may track up to nine accounts over any range of days you choose. The accounts can be used for such things as totaling reimbursable expenses, personal payables, or hours worked on various types of endeavor. As with the memo categories, you may name the accounts anything you please.

Charging numbers to an account is done within the text of your memos. The nine shift-number characters flag any numbers following for the corresponding account. So, for example, to enter ten dollars into account three, you include #10 somewhere within the text of a memo. Note that you have to omit the dollar sign in that entry, because the dollar sign, being a shift-four, is itself an account identifier. This may feel a little awkward at first.

The other ancillary function is a set of six scratch pads; they're handy for such things as phone lists or longer notes to yourself.

There are two print modes available in *Time Manager*: a screen dump, summoned by the print-screen key, and a logical printout of specified portions of your data. The latter mode will let you print a range of data larger than what the screen will hold at one time.

At any point in the program you can hit F1 and get an immediate display of the commands currently available and their meanings. This will go a long way toward easing the startup time of a fairly complex piece of software. The well organized and succinctly written manual will also help in that regard.

There appears to be one flaw in version 1.00 of *Time Manager*: the clock, which is constantly updated and displayed in the top right corner of your screen, loses its way after six p.m.. Apparently you're not supposed to work that late. **CS**

Time Manager, by Dick Ainsworth, Al Baker, and Jeffrey P. Garbers, IBM (Box 1328C, Boca Raton, FL 33432; 305-998-2000). $100.

Arithmetic Games, Sets 1 and 2. These are two sets of two games each, developed by Science Research Associates for IBM.

Set 1 includes the games Beano and Rockets. Beano is rather like bingo. The display shows a card laid with rows and columns of numbers. Your object is to fill a row or column with "beans"; you get to place one bean each time you calculate a number on the card from the numbers appearing on three dice. For example, you might roll 3, 2 and 7, and calculate (2*7)−3=11 to fill the eleven spot. Beano can be played against a human, or you can let the computer (somewhat clumsily) try to complete its own card.

Rockets is a dice-rolling game like Beano, but the numbers you calculate are used to maneuver a rocket on a fifteen-by-fifteen-square grid so as to destroy your opponent's rocket. The computer is a much better player at Rockets than at Beano, but either of these games will be endlessly entertaining for people who wonder what (2*7)−3 equals.

Set 2 provides a little more challenge. Discovery Machine presents an arithmetic black box. You are told what numbers are going into the black box, and what come out. You are supposed to guess what arithmetic processes are going on inside.

Number Chase is the second game in *Set 2*. You try to guess a string of five numbers. With each trial, you are told how many you have gotten right, and how many are the right value but in the wrong place. You are also told the product of the numbers which have been left out. To enliven things, you have the option of competing against the computer, which is a very crafty guesser. This game is based more on logic than on arithmetic. Of the four games, it is the one with the most appeal for adults.

Arithmetic Games is unpretentious but competently done. Either set would be helpful for kids who hate arithmetic lessons.

Arithmetic Games, IBM (Box 1328C, Boca Raton, FL 33432; 305-998-2000). Color/graphics adapter. $60 per set. **FJ**

Typing Tutor. By Michael Sierchio. Right off the bat, learning to type on a pc gives you one great advantage over a typewriter—you have something to look at besides your lessons. You get to watch yourself make mistakes, cheat, and even get it right once in a while. In other words, you get to watch yourself progress.

Your lesson begins with either letters, numbers, or symbols. If you are a beginner, you are advised to start with letters. When you do, you can either choose a typing lesson or a practice paragraph of the first four letters of the home row—*asdf*.

When you choose the lesson, you begin typing and continue until you manage to type a letter consistently at an acceptable speed (or your hand gets sore, whichever comes first). Then the letter moves from a slow to a fast column, and the last letter in the slow column moves in to replace it. Of course, this may seem to take years to happen, but it can be done. The rewards are right there on the screen. After ten lessons, you are given some choices, like building more

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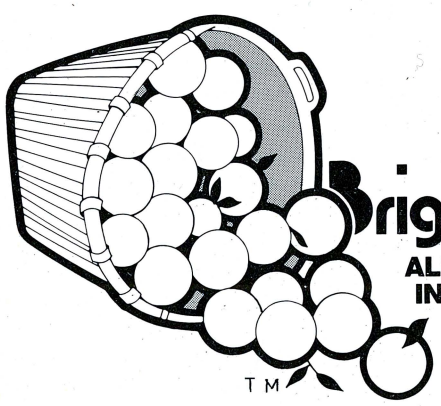

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speed, learning more keys, or going on to a practice paragraph.

The practice paragraph gives you various combination rows of the letters you are learning. You type in matching rows as best you can. Of course, you're typing nonsense, but with the use of the space bar allowed, you almost feel like a pro.

The true star of this program, however, is the time response monitoring system built into the *Typing Tutor*. This system replaces the old thwack on the knuckles that you used to get; it monitors the keyboard 100 times a second to catch even the slightest pause in your accuracy, like when you move your eyes from the screen to the keyboard or lose your nerve between, say, the *1* key and the *z* key.

Your word-per-minute average and number of mistakes therein bombard you every lesson, and all your paragraphs are instantly analyzed for errors, slowness on specific keys, and percentage of accuracy.

Ruthless? Yes. But infinitely patient.

Patient enough to handle up to thirty-nine students when the teacher mode is selected. Customized typing test paragraphs are offered and can be printed out when the *Tutor* is used with a printer. Individual student records can be stored on disk.

Clicking away on the sculptured squares of the pc keyboard takes some of the drudgery out of a traditionally dull learning process. And when the pc is used in combination with *Typing Tutor*, a fledgling typist gets a fighting chance. **MF**

Typing Tutor, by Michael Sierchio, IBM (Box 1328C, Boca Raton, FL 33432; 305-998-2000). $30.

Tax-Manager 3.0. Micro Lab and Taso have undertaken the large project of helping you with your personal federal income tax returns. *Tax-Manager* does far more than just fill in the blanks on your return. By answering a series of questions, you can determine which of the numerous federal forms you will need to fill out. You can print out a copy of the forms you need before you begin your calculations and use them as a guide if you wish. If you aren't sure whether or not a particular item is an allowable deduction, you can use the built-in checklist. This list, divided up into several smaller categories, can be run from start to finish or can be scanned to display only those items containing a key word you've supplied.

While you're hard at work entering tax information into the various forms, a help panel at the bottom of your screen offers review, message prompts, and error explanation. You'll quickly get the comfortable feeling you don't need any other documentation.

When you first look at the *Tax-Manager* package, you may be concerned at the slimness of the documentation that comes with its two program disks and sample taxpayer disk. After you have read through the manual, you still may not believe that you have sufficient information to do such a complicated task as your taxes, but plunge on and be pleasantly surprised. In those thin forty-six pages is all the information you'll need to gather everything together to prepare your taxes.

You'll appreciate the assistance afforded by sample taxpayer Uncle Sam. This amazing gentleman requires a number of forms to detail all of his activities. Just glancing through this sample return is an education in itself. As an example, consider Schedule A, Itemized Deductions. This form is divided up into separate sections for medical, dental, taxes paid, interest expense, contributions, casualty or theft loss, and miscellaneous deductions. Each section has a separate tax page to list those expenses. There can be up to seven pages per section, each page having about fifteen entry locations. If you can fill up all these available entry locations, you're probably a most unusual taxpayer! Looking over the detail pages in Uncle Sam's return may serve to remind you of a possible deduction you forgot to take, so it's a very worthwhile activity.

Doing your tax return at the end of the year is not the only thing *Tax-Manager* is good for. As you balance your checkbook each month in 1982 you can use a new set of detail pages to record your tax-deductible expenses. In this way, the monumental task of gathering your tax data will be divided up into twelve smaller pieces. When you are ready to do your returns for the next year, the hardest part of your work will be done.

There are a few minor inconsistencies and would-be-nice-ifs in *Tax-Manager*. It would be nice if the list of forms you need was retained in memory somewhere. Once you have answered all the questions and the needed-form list is displayed, it will disappear if you cycle through the same step in the menu again, so write them down somewhere! After you have printed out the forms you want, you will have to put disk 1 back into drive A and reinitialize the system, but that takes less then twenty seconds to do.

Some entry items that should only contain numeric data, such as a zip code, will not let you enter anything but a number, but other fields such as social security number, employer I.D. number, and spouse name are not protected from garbage entry. There is some inconsistency from one form to another in the way data is allowed to be changed or re-entered. For example, in the interest earned detail page you are allowed to correct an amount field by requesting the line number for it. You may then skip over the name field by using the enter key. This positions you at the amount field where you can correct your entry. On some of the other forms, if you enter the wrong line number and hit enter before you realize your error, hitting the enter key will not skip the field but will blank it out instead.

Along this same line, it would be nice to enter a form at line 1 and be able to step through it line-by-line simply by hitting the enter key. Instead you must first type the line number, hit the enter key, and then enter your data for each line you wish to fill. In the long run, that's a lot of extra typing. **SF**

Tax-Manager 3.0., by Taso, MicroLab (2310 Skokie Valley Road, Highland Park, IL 60035; 312-433-7550). $250. Δ

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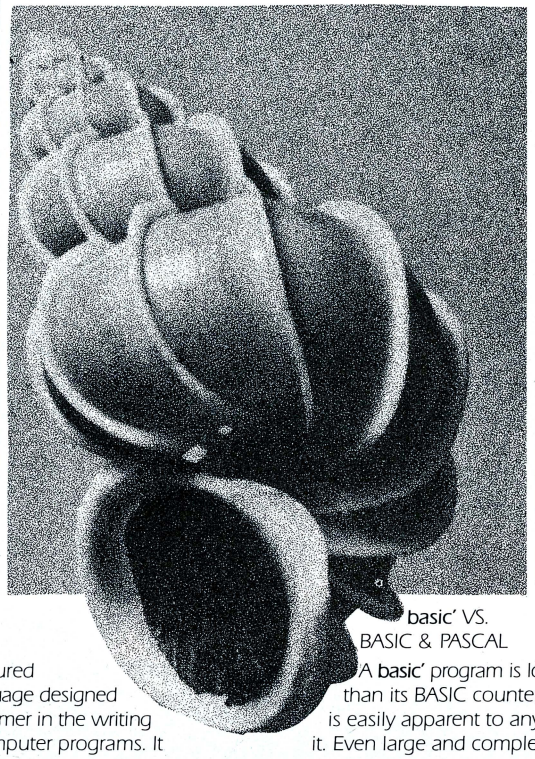

"Good order is the foundation of all good things."

EDMUND BURKE

WHAT IS basic'?

basic' is a completely structured extension of the BASIC language designed to assist the serious programmer in the writing and debugging of new computer programs. It is a set of tools that facilitate the development of well-structured code which is easy to read and maintain.

Blocks of code are indicated by a unique indentation convention, eliminating the need for extraneous statements (such as BEGIN, END) and line numbers.

basic' control statements are simple, but powerful and complete, and include the usual IF, ELSE and FOR. Added statements are REPEAT/UNTIL, PROC/DO, and CASE. The UNTIL statement is very powerful since it can occur anywhere in a REPEAT block—beginning, middle or end. UNTIL can also appear in a FOR block. The CASE statement can work with any expression—string or numeric. ELSE can also be used with CASE as an "everything else" condition. PROC and DO permit the defining and invoking of named subroutines. The listing below graphically illustrates the difference between **basic'** and BASIC.

basic' VS. BASIC & PASCAL

A **basic'** program is logically simpler than its BASIC counterpart. Its logic is easily apparent to anyone reading it. Even large and complex programs remain readable and maintainable.

PASCAL is a very good, if somewhat wordy structured language. However, PASCAL's great disadvantage lies not in the language itself, but in its microcomputer implementation. PASCAL is compiled, and compilers are fine for producing faster-running (although larger) programs. Compilers are deficient, however, in the area of program debugging. On the other hand, interpreters excel in debugging since they allow the programmer to query the state of the program after a bug has occurred. Professional programmers know that the bulk of software development time is spent debugging code. Since time can mean money, an efficient debugging environment is critical.

basic' uses the BASIC interpreter already available on your own microcomputer for efficient debugging. If faster execution is required, a **basic'** program can later be compiled by an available BASIC compiler—but only after it is debugged and running.

HOW DOES basic' WORK?

A **basic'** program is written via **editor'**, a full-function text file editor optimized for programming, and is then processed, or translated into a normal BASIC program.

editor' recognizes the **basic'** control statements and automatically indents the text to the appropriate level. The **editor'** display always reflects the current state of the program text. The listings produced by the processor (see below) are exceptionally well-ordered. Comments are automatically right justified for ease of reading, block indentation reveals the flow of control, procedures are separated by white spaces, and an extensive cross-reference is provided. Once the translation is produced, debugging can take place using the existing BASIC interpreter. When bugs are detected, patches can be applied to the translation. It is usually possible to correct from 5 to 10 bugs in translations before having to reprocess the **basic'** source program.

HOW CAN I GET IT?

basic' is now available for the APPLE, TRS/80 and IBM PERSONAL COMPUTER. Inquire at your local computer dealer or order direct using the handy order form below. You may also call TOLL-FREE and charge to your VISA or MASTERCARD.

If you would like more information, **basic'** documentation may be purchased separately for $10 which will be credited against purchase price.

!basic'

```
PRINT "ASCII CHARACTER TABLES"                          ! HEADING
REPEAT
  INPUT "FROM,TO: ";N,M
  UNTIL N=0 AND M=0                          ! DOUBLE ZEROES TO QUIT
  DO TABLE                                        ! PRODUCE A TABLE
END
!-------------------------------------------------------------------

PROC TABLE              ! OF ASCII CHARACTERS FOR CODES N THROUGH M
  PRINT "CODE","CHAR"                            ! PRINT HEADINGS
  FOR I=N TO M
    UNTIL I > 127                                  ! UPPER LIMIT
    PRINT I,                                           ! CODE
    IF I < 32                                    ! CONTROL CODE
      CASE I
        # 13                                   ! CARRIAGE RETURN
          PRINT "(RTN)"
        # 27                                          ! ESCAPE
          PRINT "(ESC)"
        ELSE                                       ! ALL OTHERS
          PRINT "(CTRL)";CHR$(64+I)
    ELSE                                 ! PRINTABLE CHARACTERS
      PRINT CHR$(I)


-------------------------------------------------------------------
```


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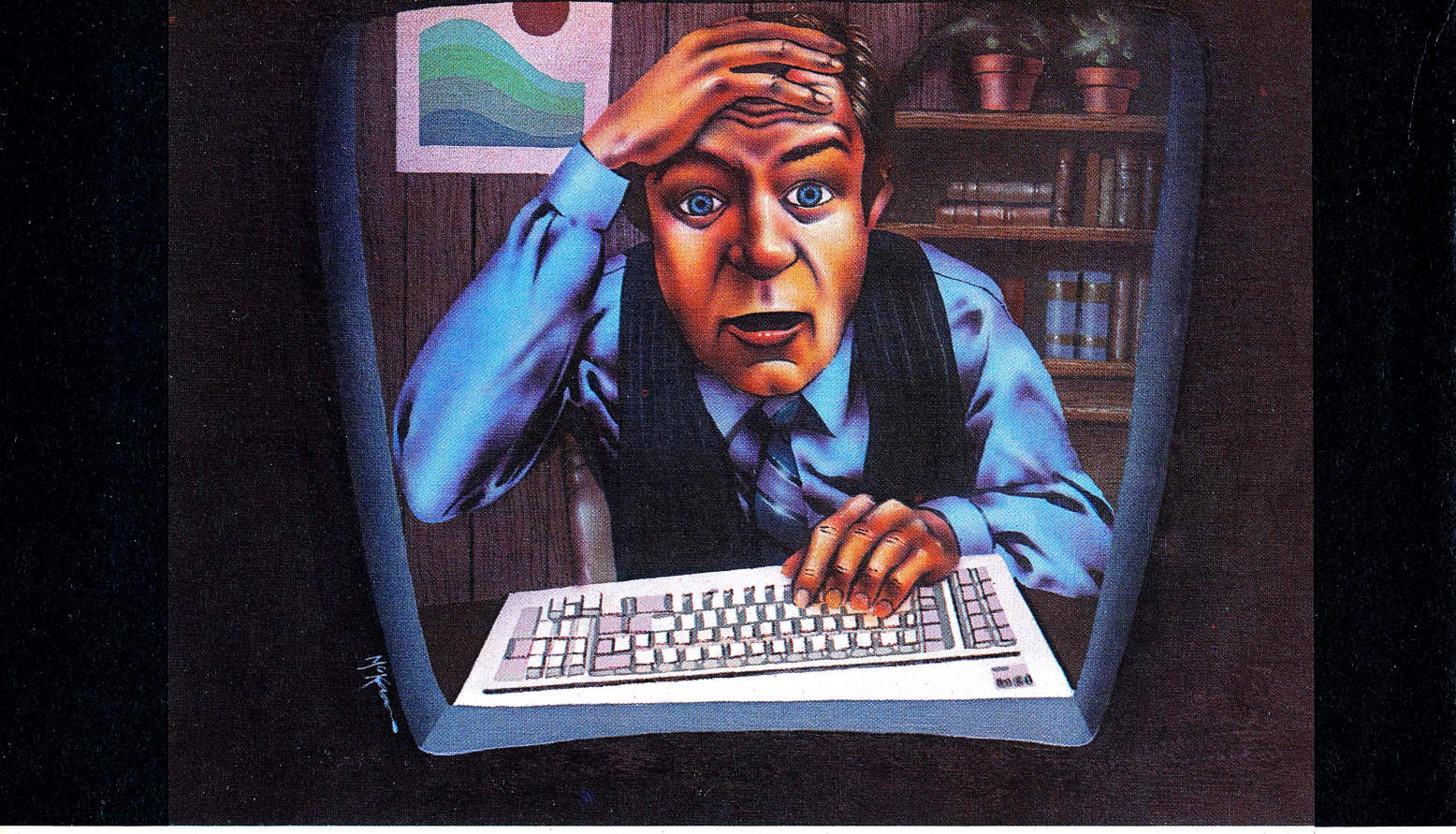


Illustration by Kevin McKeon

"WHAT?!"

The Bug That Ate Boca Raton

by Forrest Johnson

David Walonick was puzzled.

His program should have returned a value of .01, but the number on the screen was .001. He ran it again. The result was still .001. He went through the program line by line—it was very simple, written entirely in Basic. There was no error. The programmer from Minneapolis finally decided it was time to call IBM. In his words, "They told me that inexperienced programmers often have such problems."

Bugs are not like the fairies in *Peter Pan*; they do not cease to exist because people don't wish to believe in them. Other programmers were having the same problem. *The New York Times* eventually heard of Walonick's troubles and, on April 5, published an article titled, "Flaw in an I.B.M. Computer."

IBM was not at first interested in Walonick's opinions, but it was certainly interested in the opinions of *The New York Times*. Almost immediately, Walonick was surprised by a personal phone call from John Opel, president of IBM. ("I didn't know who he was. I said, 'Hi, John.' ") Opel apologized, and invited Walonick to visit the pc plant at Boca Raton. At IBM's expense, Walonick flew to Florida, and stayed in a hotel suite "bigger than my home." He was given a tour of the Boca plant, and all of his questions were answered politely. "I've never gotten such VIP treatment before."

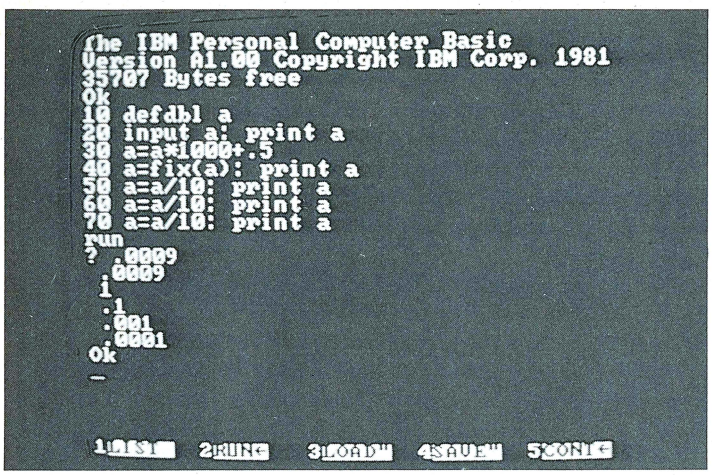
What about the Bugs? As it turns out, there are a number of bugs in the Basic interpreter, but most of them are like the crawling, six-legged creatures they're named after—just small annoyances.

IBM has released a new disk operating system that includes software fixes for most of the bugs identified to date. (See accompanying article.) Even without the new DOS, there are no bugs that cannot be circumvented by a competent programmer. There are no bugs at all that will make any difference to someone who is simply a program user.

Double Precision. The Walonick bug is in double-precision variables (which take up eight bytes, as opposed to the four required by single-precision variables). Divide a double-precision variable by ten twice, and the result will sometimes be off by a factor of ten. The error will propagate itself, returning a false answer wherever the variable is used. However, *print using* will always display a correct answer.

Rounding Errors. If you print .99 on almost any other machine the result will be .99, but if you print .99 on a pc, the result is .9899999. The reason for this is rather involved.

Almost universally, humans use base-ten numbers. Almost universally, computers use base-two numbers. In a ten-based counting system, certain fractional quantities, like one-tenth and one-hundredth, can be represented precisely, while others, like one-third, cannot. Similarly, in binary, some fractions—one-fourth and



David Walonick's program. The bug crops up with the print *commands in line 60.*

one-half, for example—may be notated exactly, while others will be off by a small amount, no matter how many binary digits are used to represent the quantity.

Rounding errors occasionally appear on all computers, because the numbers that binary must approximate and the numbers that decimal must approximate are not the same numbers. When you issue an instruction like *print .99,* the computer first has to convert your decimal value into binary and then reconvert it to decimal. Like gossip, the message may become garbled in translation.

Rounding errors occur in all Basics on all computers, but they seem to be a little more treacherous on the pc than, say, on the Apple II. They seem to occur more in double-precision variables than in single precision.

Certain textbook programming algorithms may behave abnormally because of minute rounding errors on the pc. For example, try the following program—a standard procedure for rounding off a number to three decimal places:

```
10  INPUT A
20 PRINT INT (A*1000+.5) /1000
```

This program on the pc will incorrectly round both 1.9995 and 1.9985 to 1.999.

You may also occasionally find that rounding errors will produce misleading results within *if-then-else* statements. Check the IBM Basic manual's discussion of the *if* statement (page 4-100) on this point; it tells you how to avoid being tripped up by spurious inequalities.

Display Errors. Another thing to remember while programming the pc is that numbers are sometimes displayed by the machine in one way and stored in another. To illustrate this situation, try running the following program:

```
10 A=1.21
20 B=121/100
30 PRINT A
40 PRINT B
50 PRINT B-A
```

Uninitialized Variables. Uninitialized variables are supposed to equal zero. That's what it says in the manual. However, in practice, they often check as < >0. Fortunately, most programmers do not leave uninitialized variables lying around, and this problem is corrected in the new DOS.

String Variables. For obscure reasons, if the character % is included in a string variable, a *val* statement will cause a syntax error. This problem is not corrected with the new DOS.

Hardware Bugs. On some early copies of the pc, there is a hard-

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ware defect that may cause the keyboard to freeze up. It may occur, for example, when you try to up-arrow off the top of the screen. Pressing escape and enter will usually relieve the problem. Owners who want a more permanent fix can have their system boards replaced free of charge.

The asynchronous communications adapter has given programmers headaches at certain baud settings. There is a partial software fix for this problem on the new DOS. It is more likely to help with a serial printer than with a modem. If the new DOS doesn't help, you can consult your local Computerland (which is privy to technical mail-outs from IBM).

A New Basic Interpreter? The ultimate solution for the bugs in the Basic interpreter would be a recall of ROM chips, or at least the inclusion of revamped ROM with new copies of the machine. In fact, Microsoft has prepared a new Basic interpreter for the pc, but IBM has no announced plans to revise its ROM. Δ

Swatting the PC Mosquitoes

DOS Version 1.05 has been released. You can get your DOS updated simply by bringing a copy to your dealer (the original DOS disk cannot be overwritten).

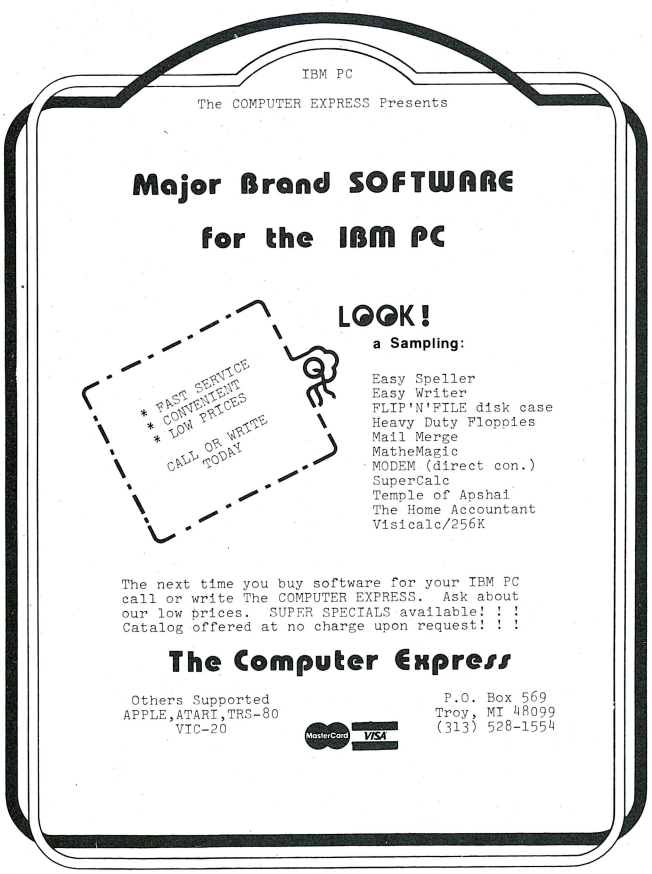
The new DOS differs from the old in the following details (this information copyright 1981 and 1982 by IBM):

1. Basic and BasicA have been updated.
2. The *Music* sample program has had its songs incorporated into the main program, so it now requires a 48K system to execute.
3. The text file "Info1.05" has been included. This file may be listed to give the user information about Version 1.05.

DOS itself has not been modified in any way.

The following table shows the workspace difference between V1.05 and V1.00. The available space has increased slightly when there is no communications buffer and decreased when one or two asynchronous communications adapters are supported:

Increase (+) and Decrease (−)	
Basic without buffer	+59
Basic with one buffer	−335
Basic with two buffers	−345
BasicA without buffer	+3
BasicA with one buffer	−391
BasicA with two buffers	−401



The following changes have been made in Basic and BasicA:

1. The Walonick bug (see preceding article) has been eliminated.
2. *Chr$(7)* can now be sent to a file or any device and will "beep" the "bell" correctly.
3. *Date$* and *time$* can now be followed by a blank before the comment or multiple statements separator.
4. The *loc* function, when used with a random file, has been fixed. Basic V1.00 returned the physical record with *loc*. Basic V1.05 returns the logical record with *loc*.
5. Variable initialization problems are now fixed. In Basic V1.00 variables sometimes did not compare to 0 correctly unless they had been explicity assigned.
6. Copyright notice and soft keys will not be displayed in Basic V1.05 if the Basic command line is used to load and execute a Basic program.
7. The *draw* statement now clips lines at the edges of the screen rather than wrapping them around to the other side of the screen.
8. Graphics *put* of objects less than eight bits wide has been fixed to work correctly with the *pset* and *preset* action parameters.
9. Basic V1.05 allows the *play* and *draw* statements to use *execute string* commands within *execute string* commands. In other words, the executed string may include *execute string*.
10. Basic V1.05 resets *pen/strig* to *off* and *play/sound* to *mf* when *run/clear* commands are executed.
11. *Circle (x, y), r, start, −end* now draws a line from the correct endpoint to the center of the circle.
12. The *inkey$* function has been corrected so that it does not hang after the last character of a soft key. The documented circumvention in the *Basic Reference Manual (poke 106,0)* is not necessary in V1.05, though it will not affect existing code.
13. The *write#* statement now pads to end of record with blanks.
14. Basic V1.05 now supports the "ignore out of paper" mode on the IBM 80 CPS matrix printer. This code is selected by executing the following statement:

```
LPRINT CHR$(27);"8";
```

See the IBM *Technical Reference Manual* for more details.

15. The *system* command will now restore the correct information for the video display that was active when Basic was loaded. This is important only for systems with both the monochrome adapter and the color/graphics adapter.
16. The *tab* function now works correctly in all cases in the *lprint* statement. In Basic V1.00 it did not work correctly after executing a *width "lpt:",255* statement.
17. *Open "lpt:" for output as #1* followed by *print#1,chr$(10)* now works correctly.
18. The *point* function no longer changes the last point referenced. Only graphics statements can change the last point referenced. (See page 3-39 of the Basic Reference Manual.)

None of the changes in Basic and BasicA will affect programs run in Cassette Basic. Δ

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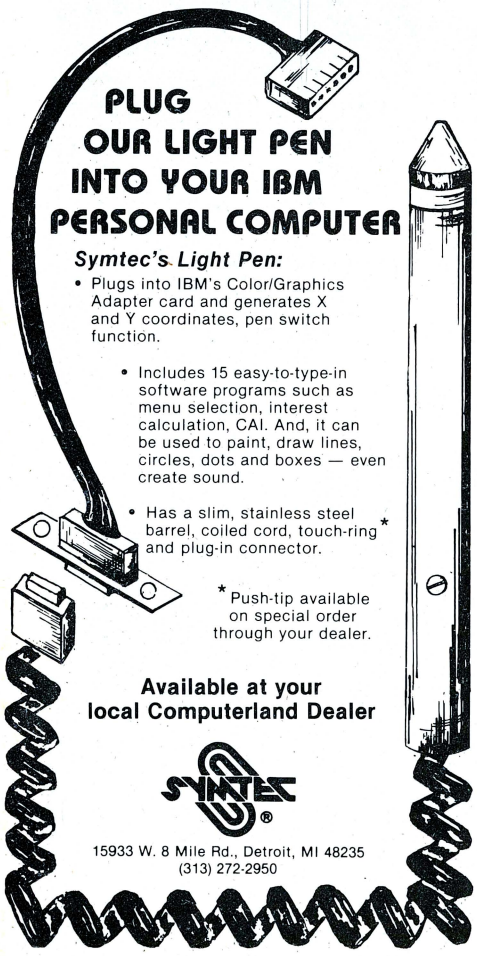
newspeak

The dictionary says humans are distinguished from apes by notable development of the brain with a resultant capacity for articulate speech and abstract reasoning. As far as we know, we've become the noisiest, most advanced banana peelers in the solar system.

There isn't much more to life than peeling a banana when you get down to it. Survival is the strongest instinct. But our brains, while keeping us alive, have also given birth to a world with many fantastic and terrible things.

Falling on your behind is a nice way of saying there's a price you pay for peeling the banana. We have slipped on the peel countless times in the past and we'll slip again, rest assured. To survive is to think; to think is to take a chance.



Marking the millenium in eighteen years means much hard work. There won't be space to fall down without causing great bodily harm. Our tools can help us get there, or our tools can destroy us all.

Not for a minute are we suggesting that microcomputers are lethal. But bigger computers and unscrupulous beings are loose in the world. There are those people who fear the ripening of the computer age. According to prophets of technological doom, mechanical, thinking machines and computers will help the evil men of the world take over.

We must be cautious and we must pay attention. Overall, the outcropping of general news stories concerning computers shows them helping, benefiting, freeing their users in greatly diverse applications.

Newspeak is an attempt to digest these news items for those of you who might have missed them in the general news media, and to keep you up on the state of the computer industry as a whole. Truth is elusive, but we mustn't give up the search.

East Side Story. Leon Watkins is a man with a mission in life. For years he has been working with gangs in East Los Angeles, California. By getting them off the street and into a learning environment, Watkins and many others believe it's possible to integrate gang members into constructive social behavior.

Watkin's latest efforts in this area involve microcomputers. Every Saturday, Watkins tours around in an old church bus and collects gang members for a trip to Data Equipment Supply in Downey. Under supervision, gang members learn about programming and word processing on Commodore computers.

Working with a nucleus of gang members who have made the trip before and know the ropes, Watkins gathers a few new people each weekend. A buddy system is used wherein two or more people work together to learn about the computer.

"I'll try anything once," explains Watkins. "I didn't have any idea that this would last so long. Taking the gangs over to Data Equipment has been very successful. We'll keep doing it as long as we can."

The program originated when Commodore loaned fourteen computers to Larry Bowder of Data Equipment to help start local microcomputer workshops for the general public. One workshop was in East L.A., and that is how Bowder met Watkins.

Now Saturdays are East L.A.-day at Data Equipment. Working in conjunction with the Los Angeles Police Academy, Bowder is striving to provide an alternative outlet for gang energy. The idea is to find an activity that is more fun than running with a gang but is also part of the real world.

According to Bowder, "Dissemination is not the answer. We try to keep the camaraderie found in gangs and let it carry over into what they're doing here."

Each Saturday is broken into thirds. The first third is spent on general typing skills. The second third involves learning basic math through CAI. The last third of the day is spent in small workshops learning programming skills, word processing, and even things like *VisiCalc*.

"It's important that they learn something that has to do with the real world," explains Bowder. "Their attitude starts changing when they think they've become involved. The social interaction possible with microcomputers is incredible. I sure didn't see it coming and I've been in this business for fifteen years."

The ultimate goal of Watkins and Bowder is to have computers in the community where the gangs are located. This way an individual can take knowledge and experience gained at Data Equipment back to help others learn on their own machines locally.

A Fistful of Nickels. Nineteen eighty-two's first quarter financial reports are in and they show the computer industry as a whole reflecting the economic slump due to the recession.

International Business Machines racked up $7 billion in sales, an increase of 9 percent over the same period in 1981. Reported profits were $768 million, up 5 percent from last year. The profit margin shrank from 11.3 percent to 10.9 percent.

The recession and high interest rates are bad enough, but inflation drastically changes some of the figures released by companies. The inflation scoreboard in *Business Week* (May 3, 1982) reports 400 companies'

profits in 1981 when adjusted for inflation.

According to the scoreboard, IBM's total sales of $29 billion in 1981, with a reported increase of 11 percent, earned a far less impressive 1 percent increase over 1980 sales.

The industry composite for office equipment companies shows an inflation-adjusted 2 percent increase in sales, far from the 13 percent increase garnered before inflation. Figures for the composite totals were calculated using the financial results of ten companies with total sales of $66 billion.

Inflation has also taken its toll on profits. IBM's a little more than $3 billion profit reported for 1981 is a little less than $2 billion after adjustment for inflation. Further analysis of four-year growth rates shows IBM's reported 12 percent growth in sales actually 1 percent after inflation, and profits down 5 percent instead of up 5 percent.

Business Week came to the conclusion that industries suffer unevenly from inflation. After adjusting costs for the consumer price index and for changes in specific prices, including depreciation and cost of goods sold, the best industry is office equipment. The current-cost profits as percent of historical cost is 93 percent, compared to 83 percent for second-place publishing and television.

The *Wall Street Journal* attributes IBM's slight first quarter profit to demand for the Personal Computer. Without the Personal Computer, the scene would have been even more dismal.

Apple Computer, on the other hand, showed a first quarter profit increase of 51 percent. Take into account inflation, and that percentage drops, but Apple is still growing at a phenomenal rate.

With total sales of $335 million in 1981, Apple missed the Fortune 500 by about $120 million. By contrast, IBM placed eighth on the 500, retaining the same position it had in 1980.

IBM's competitors in the office equipment market may be falling on hard times. Control Data showed a first quarter drop in profits of 5 percent before inflation. Honeywell showed a profit increase of 8 percent, attributable in large part to $36 million from the sale of its interest in GE Information Service. *Business Week* notes: "Without that income, its (Honeywell's) profits would have fallen nearly 63 percent."

Burroughs reported a first quarter profit increase of 22 percent, but industry analysts attribute this to the acquisition and exchange of securities.

The fact remains that the worse the economy gets, the more it affects people and business. Computers are in many different facets of life. When there are fewer new cars, houses, banks, manufacturing plants, re-

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search projects, and schools, the demand for computers declines.

The results? A lot of computer companies are riding the whirlwind dream of future sales. Many studies predict a threefold increase in the demand for office automation equipment in the next three years. Some companies will truly founder if the economy stays bad and significantly cuts into those dollars of the future.

Corporate Bootstraps. Businesses and consumers are in trouble if they invest hard-earned money in a computer system that is quickly outdated. Likewise, computer manufacturers are in big trouble if they invest in a technological development that flops or, at best, never catches on.

General Automation (Anaheim, California) was the fourth-largest manufacturer of minicomputers in the early seventies. An expensive gamble on an exotic technology called silicon-on-sapphire lost millions of dollars and sent engineers back to the drawing boards. By mid-decade, things had gone somewhat askew.

A great deal of money was spent on research and development, but no new products were forthcoming. The company's response? Several members of the executive staff took up religion and tried introducing it to employees.

One day in 1975, a top executive, attempting to fix a malfunctioning General Automation computer, placed his hands on it and prayed. Whether the prayer worked or not is a moot point, but the doubts raised by this incident still cloud the image of the once high-flying minicomputer firm.

The second half of the seventies saw General Automation's stock drop considerably and many investors abandon ship. Keeping up a good service department and customer relations was about the only thing the company did right in these years.

General Automation kept publishing software, but no new computers saw the light of day. A lot of the problems can be attributed to the solid but unproductive engineering base of the company. The founders had been engineers; research projects with uncertain market value proliferated.

When it looked like things could get no worse, in September 1979, founder and chairman Lawrence Goshorn was ousted by the board of directors. A consultant was brought in to determine what course should be taken. The conclusion reached was that the company was worth saving, but that many things had to change; a turnaround would take at least three years.

A crack senior management staff came with the new president. Many development projects were axed, and there was a sizable work force reduction. The decision was made to put out a new family of minicomputers to replace the aging 16/200 and 16/400 series. Just released, Series 900 is General Automation's first high-cost performance but cost-effective product line in a long time.

Current plans call for an increased effort in software development, as well as a microcomputer and a thirty-two bit minicomputer due in a year's time.

General Automation has paid dearly for the years of standing still, losing a good share of the market. Now they think they're on the right road to recovery. It's tough playing catch up, but it can be done.

The second year of a three-year turnaround is spent gearing up. The third year you go get 'em.

A General Automation spokesperson lamented the economy: "Now it's even more of a challenge to get the company back on its feet." Regardless, General Automation plans to make some waves in 1983. Only time will tell how they fare.

In Harvard's Way. One of the top learning institutions in the country has made knowledge of computers mandatory for all undergraduates. Explaining the difference between samarium and zirconium is still optional, but understanding simple programming is now considered part of getting a good education.

Undergraduates at Harvard University have to display at the end of their freshman year a certain understanding of quantitative reasoning. The requirements call for knowledge of data analysis—probability, means, and standard deviations—basic math through Alegbra II, and basic computer science.

Adequate knowledge of computers for a freshman is defined as the ability to write a short program. Ideally, the program should involve a loop, inputting and outputting data, and a simple function. Warren Reed, assistant director of admissions, calls it a "folksy" test, not "particularly onerous."

"We're not trying to scare students away, but we're very serious about making people do it."

If a student can't pass this requirement at first, they attend minicourses for basic but detailed instructions on programming. In cases where the minicourses don't do the trick, an introductory course in computer science is called for.

"We don't exclude people without computer experience, but we keep an eye out for some quantitative sense. We're encouraging the use of computers as part of the academic experience."

Over Here. Recession is not the only problem facing the computer industry. Foreign competitors, claiming superior research and new technology, have long been threatening to outpace American companies in the marketplace.

Several large American semiconductor companies have joined to form the Semiconductor Research Cooperative to beef up basic research in universities. Mounting foreign competition and a shortage of highly trained engineers and scientists are seen as the symptoms; not enough money for research is the disease.

Carried out through contracts with universities and nonprofit research organizations, the research corporation's emphasis will be on long-term projects of three to ten years' duration. Sponsored by the Semiconductor Industry Association (Cupertino, California), the Semiconductor Research Cooperative's chairman is Erich Block of IBM. The proposed budget for the first year is $6 million.

Integrated circuit use, design, and manufacture, will be a main focus of effort in the program. CAD and the use of materials like gallium arsenide for advanced chips are possible research subjects. Participating companies will theoretically be able to use the results gotten from participating universities in product development and creating advanced technology.

But those results may be a while coming. In the beginning, participating companies' financial contributions will look like prepayment of royalties. Nonetheless, the cooperative has reportedly been greeted with enthusiasm in both academic and semiconductor circles. Δ

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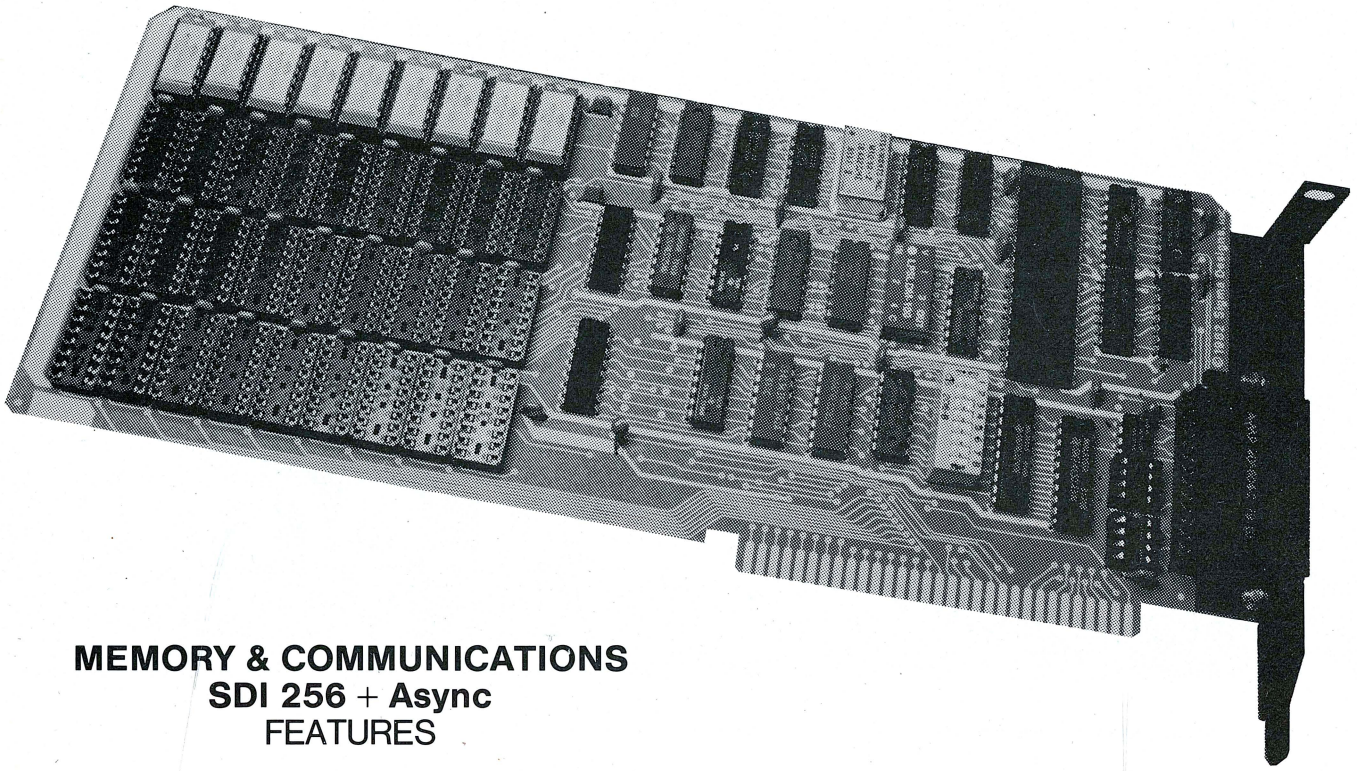

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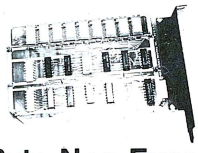

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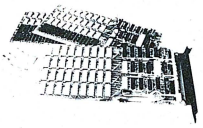

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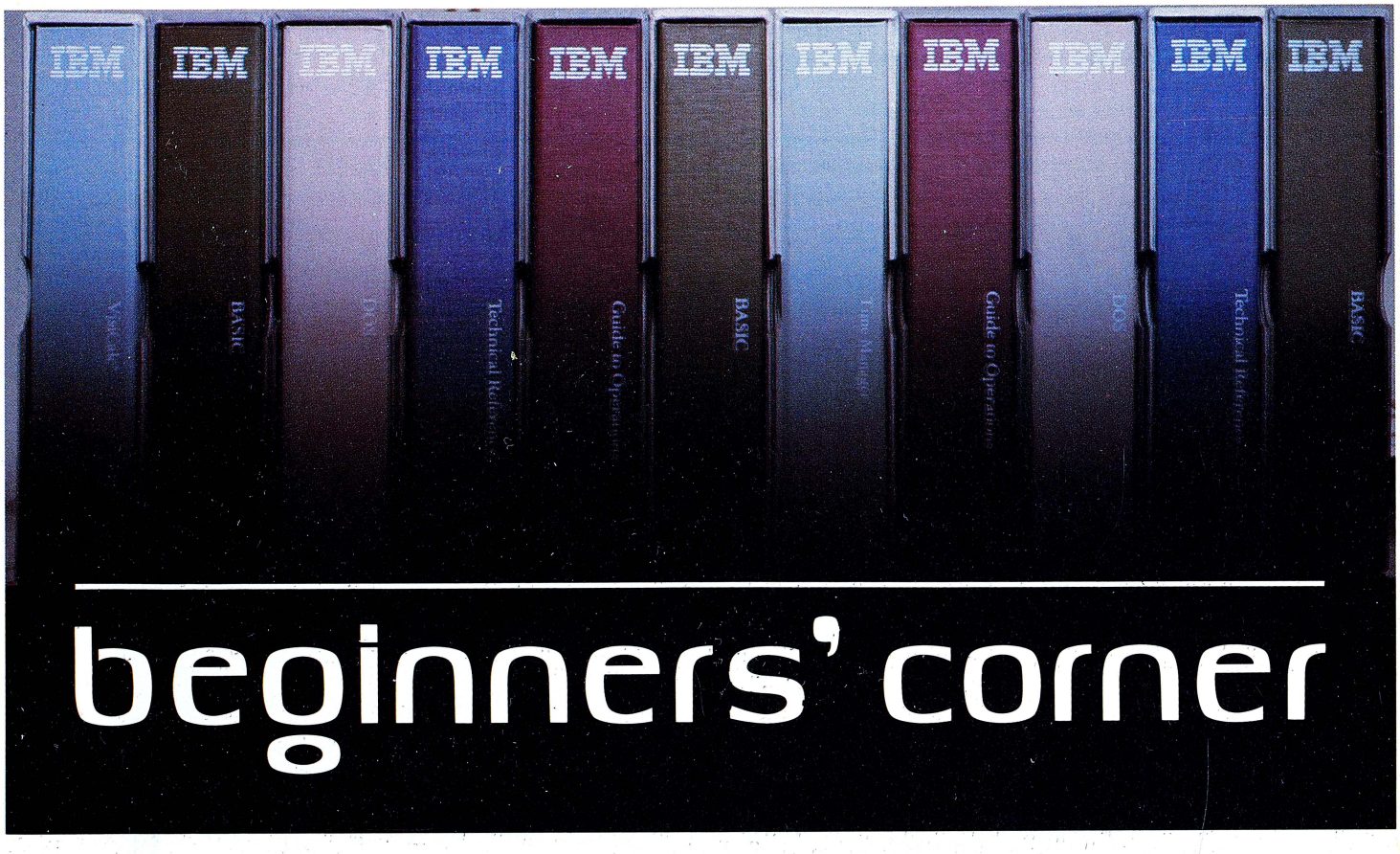

beginners' corner

by Craig Stinson

Beginners' Corner is an ongoing series of articles for the newcomer to computing. Herein we assume no experience with or knowledge of computers—only that you own or work at an IBM Personal Computer.

Most of these articles will pertain directly to the pc—how it works, how it's designed, what you can do with it, and so on. Others will bring up more abstract, though still mostly nontechnical, notions about computing in general.

Abstractions can wait, however; we'll start with some practical matters, like how to get the pc running, how to sample the IBM sample programs, and how to make a backup copy of the IBM Disk Operating System.

We'll assume a couple of things at the start: that your system is assembled and that you're working with at least one floppy disk drive. If the innards of your system are not yet put together—that is, if you have memory or adapter cards that have not yet found their homes inside your machine—you'd do well to pack up your system and return it to where you bought it. A good dealer ought to take care of that business for you.

If the external components of your computer are still unassembled, you might want to consult your dealer for advice on how to put them together, or you can look at the red reference manual from IBM, called *Guide to Operations.*

The typical pc system will consist of three or four separate physical elements: a system unit, a keyboard, some kind of video display, and possibly a printer. The system unit is IBM's name for that bulky item to which the keyboard, display, and printer are appended; the attached devices are known collectively as *peripherals.* To be accurate, the floppy disk drives should also be called peripherals even though they're built in to the system unit.

All your peripherals, except for your disk drives, should be connected to the back end of your system unit. The *Guide to Operations* offers verbal and graphic descriptions of how that's to be done.

Doping Your DOS. In addition to *Guide to Operations,* you should have received at least two other manuals, titled *Basic* and *DOS,* with your system. Now that you've got everything hooked up and ready to go, grab the pink one, *DOS.* The Disk Operating System, pronounced doss for short and also variously known as PC-DOS or MS-DOS, is a set of instructions that tells the pc how to do such fundamental things as store and use information on disk and run programs. Without it or some comparable piece of system software, you wouldn't be able to do anything with your computer. The instructions that comprise DOS are stored on a floppy disk that comes in a pocket in the back of your DOS manual.

A floppy disk, also sometimes called a diskette, is sort of like a cross between a length of recording tape and a phonograph record. Like tape, it provides a means of storing data magnetically. Like a record and unlike tape, it allows random access to data. That just means that your computer can go out and fetch material from any spot on the disk without having to read through everything sequentially from the beginning.

Grab the DOS disk with your thumb on the pink label and slide it out of its paper envelope. You'll see an elongated sausage-shaped opening near the side away from the label. The shiny surface showing through that opening is the disk itself. The black area all around it is a permanent cardboard encasement that keeps your data from getting dusty or fingerprinted.

When your computer wants to use the disk, it will spin that

shiny surface around inside the black casing, and a device called a read/write head will travel back and forth beneath that sausage-shaped hole. The large round opening in the center of the disk accommodates the disk drive hub, and the little hole beside the big one is superfluous. Some other computers use that little hole as a timing device to help their disk drives find their way to selected disk sectors. The IBM uses a different navigational technique, but disks are generally manufactured in such a way as to be acceptable to a variety of machines—hence the little hole.

Care and Feeding of Floppy Disks. There are a few things you need to know about handling floppy disks. First, don't contaminate the active surfaces. The area of disk required to store a datum is microscopic in size; a fingerprint or a particle of dust or smoke is monumental in comparison. So hold the disk by the label end and keep it in its paper envelope when you're not using it.

Don't leave a disk on your dashboard in the noonday sun. Don't bathe it in coffee. Don't bend it; it's only a little bit floppy. And don't wave a strong magnet over it. Included within the last injunction are: Don't set it on your television set or your video monitor and don't send it through the x-ray machine at the airport. Hand it to the security people there instead.

Now that we've got warnings out of the way, slide that thing into your disk drive—the drive on the left if you have two of them. (The drive on the left is called drive A.) Remember, the sausage hole is the business end, so that goes in first. If you've got your thumb on the label you can hardly put it in wrong. If you do happen to put a disk in the wrong way—upside down, backward, or whatever—you'll do no harm to the disk. You may get an error message because the computer won't be able to do what you want it to do, but no harm will be done.

After you've got the disk in the drive, set your eyes to the level of the opening in the drive and peer inside. You'll see a little gray hub hovering over the round opening in the center of your disk, and you'll notice that the hub is connected to the disk drive door. As you close the door, the hub is lowered to fit snugly into the disk. You have to have the door closed in order for the machine to be able to spin the disk.

Close the door now and turn on your video monitor if it has its own power switch. If you're using the IBM Personal Computer Display (the green monochrome screen), there won't be anything to turn on, because the display gets its power directly from the computer.

Turn the system on now, by throwing the main power switch, located on the right side of the system unit, near the back. You should hear a faint click and the stirrings of a fan within the system unit, but nothing else will appear to happen for a moment or two.

The Thirteen-Second Physical. Actually there's a lot going on inside. The pc is busy giving itself a physical checkout. It does this every time you turn it on. IBM calls this procedure the power-on selftest. How long it takes depends on what optional equipment you have on your machine. With 64K of memory, two disk drives, and the monochrome adapter card, the test takes about thirteen seconds. With more equipment it may take as long as forty-five seconds. In the meantime, some four seconds after you hit the power switch, a blinking line should appear on your video screen. That line is called a *cursor*.

Once your system has passed its power-on selftest, the following things will occur: the red light on your disk drive (the drive on the left if you have two) will come on, and the drive itself will make some racket. Then you'll hear a single short beep from the computer's speaker, which is located to the left of the disk drives, near the front of the machine. If your DOS disk is loaded correctly in the drive on the left and the door is closed, the computer will read a portion of that disk and in a moment will give you a message on the screen asking you to tell it the date. Go ahead and type in the date—using either slashes or hyphens between month, day, and year—and then we'll digress for a moment. After you've typed the date, hit the enter key; that's the one with the bent arrow, on the right side of the keyboard, roughly in the spot where a carriage return key would be on a typewriter. On some computers this key is called *return*.

Beepers, Jeepers. The single beep you heard when your pc finished its selftest was just to tell you everything is okay. If you hear any more beeps during the selftest, or if you see any mysterious numbers on your screen (numbers not within the DOS copyright and version statement), it's possible there's something amiss within your system. Give your retailer a call.

A beep from your computer is generally just a signal to get your attention. In the case of the single beep that follows your power-on selftest, it just means that all's well within.

The purpose of the red light on your disk drive is to tell you that the drive is in use. The reason you want to know when the drive is in use is that you could, under some circumstances, compromise data stored on disk if you were to open the drive while it was running. If the computer were reading data at the time you opened the door, you'd abort the read operation but do no damage. On the other hand, if it were trying to write, you could mess things up a bit—depending on where the read/write head was situated at the moment you intervened. You could cause what's called a disk crash.

When you're typing in the date in response to DOS's query, or for that matter when you're typing in anything, if you should happen to type something you didn't intend to type, you can use that straight arrow key, just above the enter key, for backspacing and erasing. We'll have more to say about the pc keyboard in another installment of this column.

One more bit of digression: if you turn your computer off and

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then immediately turn it back on, the normal start-up sequence of events will not occur. The fan will run, but the computer itself will be as dead as if you left the power off.

Power to the PC. The Personal Computer power supply, located within the system unit, has a feature that protects the computer's electronic components against sudden, possibly damaging, upsurges in current or voltage. As a consequence of that protection, you need to leave your machine off for three seconds or so before you can turn it back on.

Another way to restart your machine if the power is already on is to hit the key marked Del with your right hand while holding down the keys marked Ctrl and Alt with your left. This complex feat is known as hitting control-alt-delete; it's also called system reset. IBM deliberately made it awkward to do so you wouldn't do it by mistake.

After you enter the date, you'll get a version and copyright message from IBM, and you'll get the symbol A>next to that familiar flashing line, the cursor.

The A>is what's called a prompt. A prompt usually serves two functions: it gives you some bit of information you need and it lets you know that it's your move, that the computer is ready to hear from you. In this case the information conveyed is that the computer presumes your next instruction will involve disk drive A.

Drive A, in this case, is said to be the *default* drive. Default is a common computer term denoting a condition currently in effect or a response that the computer expects to receive from you. The computer will assume its default value to be correct unless you act to override it.

For example, if you now issue a command that involves a disk drive, that command will be carried out upon drive A, because that's the current default drive. If you have two disk drives, you can change the default drive to B by typing b: or B: and hitting enter. You'll then get a B> prompt to confirm your change.

Note, by the way, that all commands issued to DOS may be in either lower-case or capital letters—or a mixture of the two. DOS doesn't care. To get capital letters on the pc keyboard, you hold down either of the two keys with the fat upward-pointing arrows. They're located in approximately the same place as the shift keys on a normal typewriter. Hitting the caps lock key will convert all letter keystrokes to upper case, but you'll still have to hold one of the shift keys down to get symbols like # or &. Hitting caps lock a second time releases the shift lock.

A File by Any Other Name. One of the most important functions that DOS performs is keeping track of what's stored on a disk. Programs and other data are kept on disk in the form of files of various types, much as you might keep material in a cabinet stored in discrete file folders. In order to save a file on disk and be able to find it again later, the operating system must maintain an index of the disk's contents, showing the nature and size of each file as well as the location of each element within the file.

If you type *dir* and hit enter, you'll get a list of what's currently stored on your disk. The list is in four columns, representing respectively the name of the file, an optional extension to the file's name (often used to indicate the general type of the file), the relative size of the file, and the date the file was created or last altered.

Go ahead and do this now and see what's on your DOS disk. You'll probably find there are more files on disk than can be listed on your screen at one time. When the screen fills up, the names at the top of the list will move off and everything else will be bumped upward as new names appear at the bottom. This type of screen activity is called *scrolling*. You can stop the screen from scrolling by striking the key marked Num Lock with your right hand while holding down the key marked Ctrl with your left. Then, after you've read what's on screen, you can allow the scrolling to resume by hitting any key. This combination of keystrokes, called control-num-lock, will suspend any moving screen display.

DOS can tell time as well as dates, although its timekeeping ability is only relative. If you type the word *time* and hit the enter key, DOS will show you—to the hundredth of a second—how long you've had your computer on or how long it's been since you reset the system by typing control-alt-delete. It will then also give you the opportunity to type in the current time of day. Once you've given the system the correct time of day, it will function as an accurate clock. Note that it tells time in the European or military style, recording p.m. hours as twelve through twenty-three. If the time passes 23:59:59.99, DOS will bump the date a notch, so your files will be dated appropriately even if you're working late into the night.

Getting Down to Basics. Now that you've learned about time and date and how to call up the disk directory, it's time to do something a little more worthwhile. Fortunately IBM has provided you with a few demonstration programs. You can run these demos by typing *basic samples*—and, of course, hitting enter.

Once you get past the *Samples* title page, you'll come to what's called a *menu*—computerese for a set of choices. You'll also see by looking over the list that some of your options require you to have the color/graphics adapter installed in your machine. The rest can be run on machines using either the color/graphics adapter or the monochrome adapter. The *Calendar* option, which will generate a calendar for any month in the range of 1981 to 1989, requires that you have a printer.

When you've finished checking out the sample programs, return to DOS and we'll make a backup of your DOS disk. A *backup* is a duplicate disk—your protection against unforseen mishap. It's a good idea to back up any valuable programs or data. And since you couldn't run any programs stored on any disk if you didn't have the operating system, it's especially important to have an extra copy of DOS on hand.

To get back to DOS and the A>prompt, hit the key marked Esc until you see the sample program menu. Then hit it one more time. You should now see a different kind of prompt—the symbol *OK*. This prompt tells you the computer is ready to receive instructions in the programming language Basic. From the OK prompt, type the word *system* and hit enter, and you'll be back in DOS.

If you should happen to lose your way along the path just described, you can also return to DOS by resetting the machine—by hitting control-alt-delete.

In order to do what you're about to do, you're going to need a disk that either is blank or has nothing of value on it. This disk will become your backup. Any data currently recorded on it will be gone when you've finished the first step of the procedure, so be sure that whatever's there is expendable.

How To Format. The first thing to do is to format the backup disk. To format a disk means to structure it in such a way that data can be stored upon it. A virgin disk, fresh out of the wrapper, is not yet ready to receive data. The computer has to map out the disk in tracks and sectors (more about this later) before anything else can be written upon it.

Here's what you do. If you have two disk drives, put your original DOS disk in drive A and your target disk—the one that will become your backup—in drive B. Assuming now that you're looking at the A>prompt on screen, type *format b:* and hit enter. Don't forget the space after format and the colon after the b. Drive A will commence to whirl, and then you'll be instructed to insert your target disk in drive B and hit any key.

There are a couple of reasons why you have to make this additional keystroke before the formatting begins. If you weren't ready with your target disk in drive B, this pause would give you a chance to get ready. Also, if the disk you're about to format is not brand new but instead already has data on it, you'd have one more chance to confirm that you don't mind erasing it.

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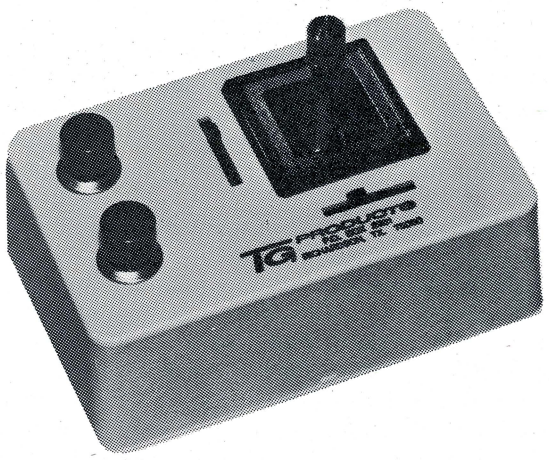

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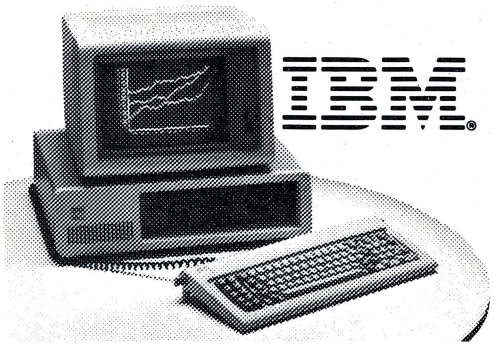

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Okay, so hit any key now, and drive B will come to life. The format procedure should take a little over half a minute. When it's done, you'll be asked if you want to format any more. This query gives you the option of formatting several disks without having to retype the command each time. Answer with an n.

If, during the formatting process, you happen to get any strange error messages, like "Track 0 bad-disk unusable," take your disk out of B, reinsert it, and try again. It doesn't happen often, but once in a while the operating system may see something on a disk that it doesn't like. If repetition produces the same result, you may in fact have a bum disk, although the chances of that are slim.

If you're working with a one-drive system, start by typing *format* followed by enter. The computer will ask you to insert your target disk in drive A and hit a key; the procedure is the same from there.

Coping with Copying. To copy the DOS disk, using a two-drive system, leave the DOS original in A and your freshly formatted target disk in B. Type *diskcopy a: b:* followed by the enter key. Don't omit the colons and spaces. You'll get a message and a request for a keystroke when you're ready; since the disks are already in the appropriate places, hit another key and off you go.

To make a copy with only one drive, insert the DOS original and enter the word *diskcopy* (in other words, type *diskcopy* and hit the enter key). You'll be prompted to insert your original disk—the one you want to copy—and strike a key. Since the one you want to copy is DOS, the disk that's already in the drive, you can just hit another key and let it rip.

Here's what happens when you copy a disk. The computer reads a portion of your source disk, momentarily stores what it gets (by writing the data onto certain memory chips within the system unit), then spits the material back out onto the target disk. When you do this with your source and target disks in separate drives, it all happens automatically without requiring intervention on your part.

If you have only one drive, the procedure is more laborious but yields the same results. You have to exchange the disk in the disk drive several times because the computer can't read in the entire contents of the disk in one pass. How often you'll need to swap depends on how much memory you have in your system.

A word of warning: if you're copying with a single-drive system, you will tell the computer when you've finished making a disk swap by striking some key on the keyboard. Be sure you strike the key smartly. If you hold the key down, the computer may actually record two or more keystrokes instead of one (all the keys on the pc repeat if you hold them down a half second or longer). It will store successive keystrokes in a memory area called a *buffer*, and when it comes time for the next disk swap, it will look at the buffer and think you've already hit another key and told it to proceed with the copy process. This could have awkward consequences for you.

Keeping Tabs on Your DOS. Besides striking the keyboard smartly, there's another way to protect yourself against such an undesirable outcome. Take a look at the disk onto which you've just copied or are about to copy DOS. You'll notice there's a notch on one side of the disk, near the end with the label. If you cover that notch with a piece of tape or paper, the computer will be unable to write on the disk. It may read it, but not write on it. A disk in such a condition is said to be *write-protected*, and the people who sold you the disk should have provided you with some sticky tabs for exactly that purpose.

When you're making a copy—with either a single-drive or a double-drive system, but especially with one drive—it's not a bad idea to put a write-protect tab over the notch on your source disk. That way, even if you happen to put the wrong disk in at the wrong time, you'll get a complaint from the computer—a write-protect error—but your source disk will not get written upon.

Now take a look at the DOS disk and compare it physically to your target disk. No notch at all on the DOS disk. That's because IBM has no intention of letting you overwrite that important disk. Software that's vital to the operation of your computer frequently is sold on permanently write-protected disks of this sort.

After you've finished making your backup, you can ask the computer to compare your source disk to the newly made target disk to verify that the copy is correct. To do this on a two-drive system, put one disk in A and the other in B and type *diskcomp a: b:*, followed, of course, by the enter key. On a single-drive system you type exactly the same command with your original disk in the drive; you'll be prompted in a moment to remove the original and insert the copy. In either case you should get confirmation that your duplicate is indeed a faithful replication of your original.

Now that you've learned the mechanics of backing up, you face the more urgent and crucial task: forming the habit of doing it. If you use your pc for creating and maintaining valuable records of any kind, you ought to back those records up regularly.

The more you read and learn about data processing the more you'll be nagged on this point. We won't belabor it here. Δ

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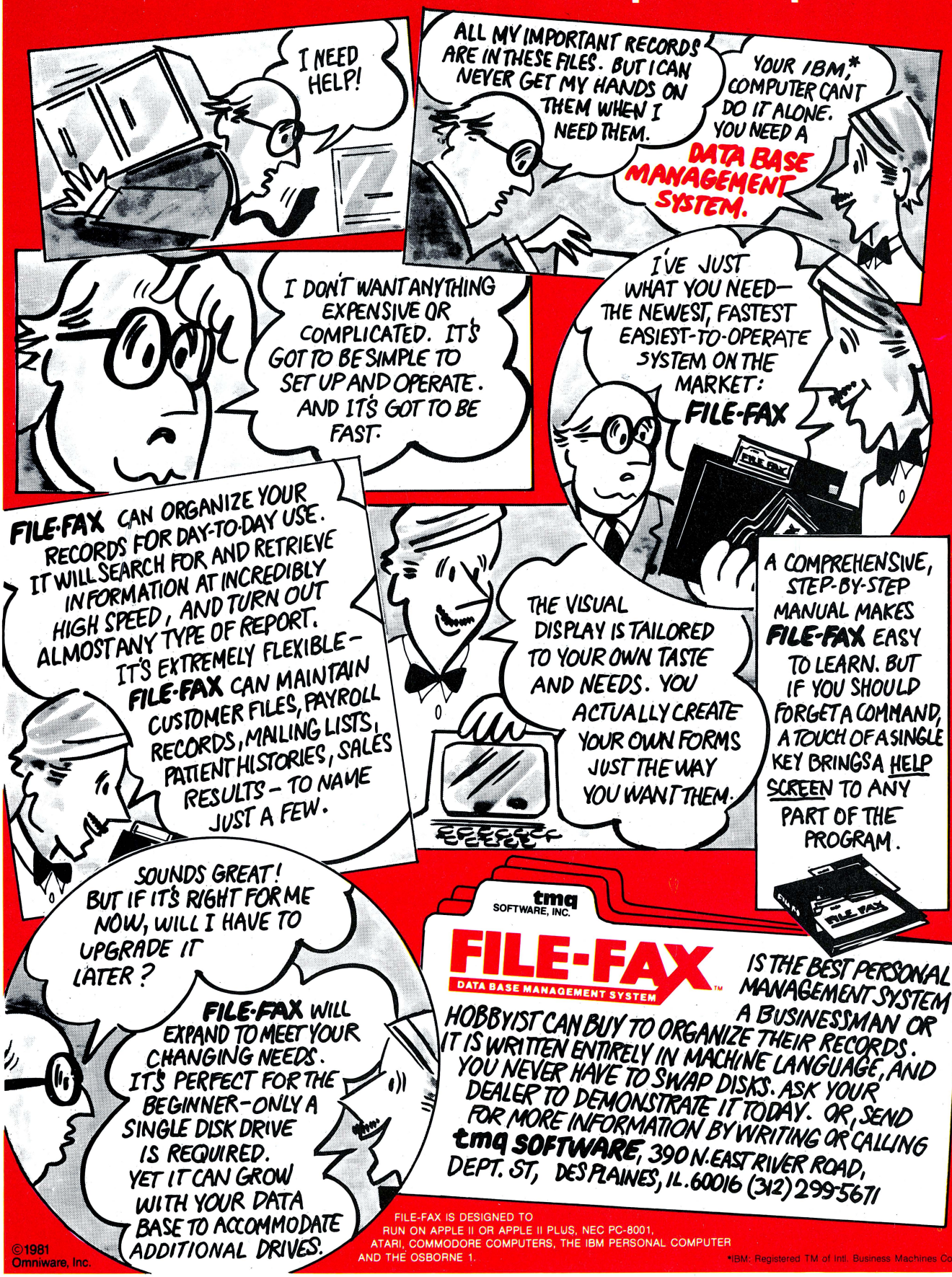

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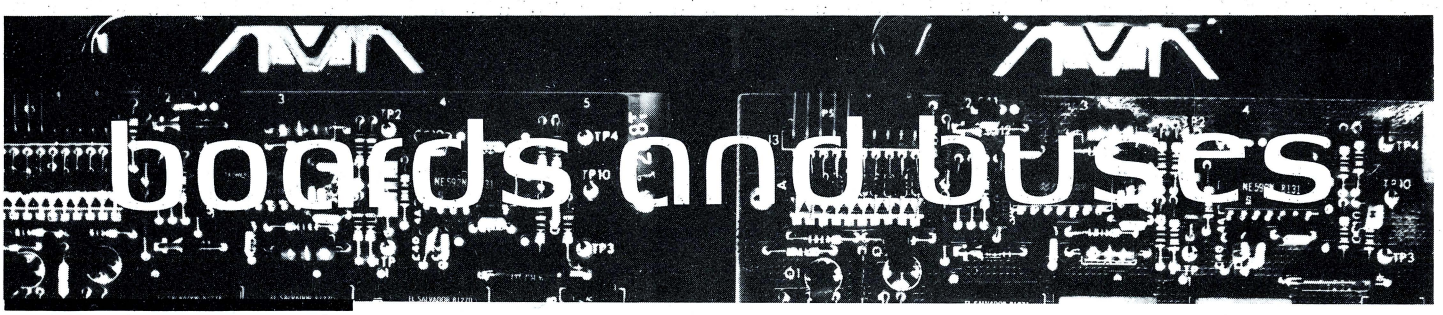

by Richard Kaapke

Some of the IBM Personal Computer's most appealing features have to do with its display options. You can choose from a wide variety of screens to suit your particular purposes.

The IBM Personal Computer Display—also known as the Monochrome Display, because it only displays the color green—is the only display you can purchase for the Personal Computer that has the IBM name on it. This display is powered directly by the system unit (it has no power cord that you can plug into the wall) and runs only in conjunction with the monochrome display and printer adapter card.

The monochrome display can display twenty-five eighty-character lines per screen. The characters themselves are very pleasing to the eye; they're formed out of a matrix of dots nine wide by fourteen tall. The resolution of this nine-by-fourteen matrix is high enough that, although you can see individual dots if you get up close and strain, the characters look as good as they do on most printed documents.

The monochrome display uses what's called a high-persistence green phosphor (P39) and has an etched surface to reduce glare. The high persistence phosphor causes characters to linger on screen for a moment after they're no longer being actively displayed, and this has the effect of reducing screen flicker.

Winsome Threesome. The combination of the green color, high-persistence phosphor, and anti-glare etching makes the IBM Monochrome Display one of the most eye-pleasing, comfortable video displays you can use with your Personal Computer.

There are some drawbacks to the monochrome display, however; it will not produce colored output (other than green) or point-to-point graphics. The design of the adapter for the monochrome display precludes its use for business graphs or for games that draw colorful spaceships. You can't even draw a simple circle on the IBM Monochrome Display.

It is possible, however, to draw a variety of fancy borders on the monochrome display. The Personal Computer has an extensive character set (see figure 1) including a great many special characters as well as the usual alphanumeric symbols and punctuation marks; some of these characters can be linked together to create simple graphic displays.

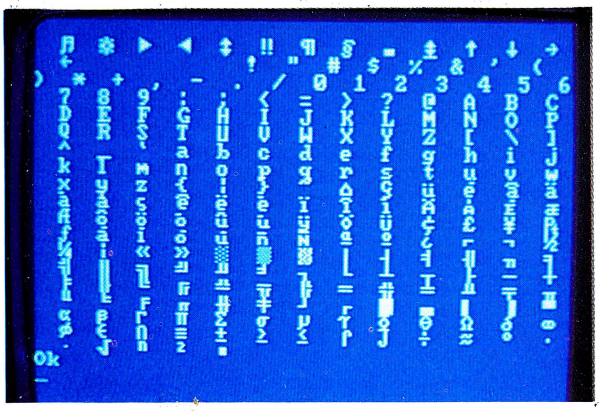

Figure 1.
The pc character set.

For those who want color and point-to-point graphics capability as well as normal text display, IBM has an alternate adapter card, called the color and graphics adapter. For reasons unknown, the nice IBM Monochrome Display will not run off this adapter, which means that you have to purchase a non-IBM monitor for it, even if you don't plan to take advantage of the color capability. Fortunately, there are a number of monitors from which to choose.

With the color/graphics adapter card you have three screen modes to choose from: text, medium-resolution graphics, and high-resolution graphics. The term *text* for the first screen mode is, perhaps, a bit misleading, because you can actually print characters on the screen in any of the three modes. You can only create graphics, however, in the two graphics modes.

Within the text mode, you can choose between displaying eighty characters on a line or forty. Either way you get twenty-five lines on a screen. The characters themselves, in text mode, may be printed in any of sixteen colors over a background that can be any of eight colors.

Rugged Resolution. The characters drawn through the color/graphics adapter are coarser than those drawn through the monochrome adapter. An eight-by-eight-dot box is used, in contrast to the monochrome adapter's nine by fourteen. The printing that results is nice, but distinctly less nice than that produced on the monochrome display.

In the medium-resolution graphics mode, you can set the background to any one of sixteen colors. For the foreground, you can then choose from two sets of three colors each, so that a total of four colors can be displayed at any one time.

IBM calls the two foreground sets palette 0 and palette 1; palette 0 consists of cyan, magenta, and white, while palette 1 offers green, red, and brown. Either palette may be selected for display with any of the sixteen background colors, but you can't use members of both palettes in the foreground at the same time. If you issue a command to select palette 1 while figures are displayed on screen in palette 0, those figures will change to their counterpart colors in palette 1.

In medium resolution, any point in a 320-by-200 matrix can assume one of the three foreground colors. Powerful instructions built in to the Personal Computer (in ROM, in Cassette Basic) allow you to plot points easily or stretch a line from point to point. Additional commands in Advanced Basic (on the DOS disk) facilitate the drawing of circles and ellipses.

The high-resolution graphics mode is black and white only and offers a picture array 640 dots wide by 200 dots tall—twice as many dots, in other words, as offered in the medium-resolution picture array. All the instructions for drawing in medium resolution work in hi-res as well.

Circling a Cinch. In both graphics modes it's simple to print information and to mix printing with graphics. Drawing a circle around a word printed on screen, for example, is no problem. The

text, however, is subject to the color limitations of the two graphics modes.

If you do a little arithmetic, you'll see that the resolution of the screen in the forty-column text mode is the same as in the medium-resolution graphics mode. The text characters are displayed in an eight-dot square matrix. Eight dots wide times forty characters per line equals 320 dots; eight dots deep times twenty-five lines per screen equals 200 dots.

By the same kind of calculation you can see that the eighty-column text mode is equivalent in resolution to the high-resolution graphics mode: 640 dots across by 200 dots up and down.

Everything displayed through the color/graphics adapter, whether text or picture, is treated as graphics. Text characters are handled as tiny, eight-by-eight-dot graphic shapes. It's because of this method of character generation that you can print words in various colors in text mode and mix graphics with text in the two graphics modes.

Figure 2 summarizes the display modes available with the color/graphics adapter card.

Can you get a nine-by-fourteen-dot character and graphics too? IBM says no. The adapters for the high-resolution character and for graphics are two very different creatures, and their outputs are incompatible.

This means that the IBM Monochrome Display works only with the adapter made for it and cannot be used with the color/graphics adapter. Similarly, if you wanted a display that would plug into both display adapters, you would be disappointed. It doesn't exist.

	Background colors	Foreground colors	Resolution
TEXT	0 = black 1 = blue 2 = green 3 = cyan 4 = red 5 = magenta 6 = brown 7 = white	0 = black 1 = blue 2 = green 3 = cyan 4 = red 5 = magenta 6 = brown 7 = white 8 = gray 9 = light blue 10 = light green 11 = light cyan 12 = light red 13 = light magenta 14 = yellow 15 = high intensity white	Either 40 characters by 25 lines or 80 characters by 25 lines
MEDIUM-RESOLUTION GRAPHICS	0 = black 1 = blue 2 = green 3 = cyan 4 = red 5 = magenta 6 = brown 7 = white 8 = gray 9 = light blue 10 = light green 11 = light cyan 12 = light red 13 = light magenta 14 = yellow 15 = high intensity white	Palette 0 green red brown Palette 1 cyan magenta white	320 dots horizontal by 200 dots vertical
HIGH-RESOLUTION GRAPHICS	black	white	640 dots horizontal by 200 dots vertical

Figure 2.
Display options available with the color/graphics adapter card.

Switch and Save. It is possible, of course, to buy both adapters—if you don't mind spending the extra money and using the additional peripheral slot. If you decide to go this route, you'll need to be careful on one point: be sure that the DIP switches on your system board are set to select the monochrome adapter (see page 33 or page 15 in your *Guide to Operations* manual). Switch 5 and switch 6 on bank 1, in other words, should both be off. If either of these switches is on, you'll blow the fuse on your monochrome display. That's not fatal, of course, but you'd probably just as soon it didn't happen.

Once your system is up and running in monochrome, you can use the following Basic program to select the color adapter:

```
10 'Program to switch output to color adapter
20 KEY OFF : CLS
30 WIDTH 80 : DEF SEG=0 : A = PEEK (&H410) :
   POKE &H410, (A AND &HCF) OR &H20
40 WIDTH 40 : SCREEN 1 : SCREEN 0 :
   LOCATE ,,1,6,7
50 KEY ON
```

Then, when you want to switch back to mono, use this:

```
10 'Program to switch output to monochrome adapter
20 KEY OFF : CLS
30 WIDTH 40 : DEF SEG=0 : A=PEEK (&H410) :
   POKE &H410,A OR &H30
40 WIDTH 80 : LOCATE ,,1,12,13
50 KEY ON
```

Note: If you use the system command to go to DOS after you've switched from monochrome to color display, use the following command to square up the screen:

```
A>MODE 40,R,T
```

After you do this, you'll see a test pattern and a question. Read the mode command explanation in the DOS manual for help.

There are a variety of monitors, some color and some black and white, that can be used with the color/graphics adapter. They fall into two categories: RGB and composite.

Crispier Colors. RGB monitors process separate red, green, and blue signals from the computer. They often make the best general-purpose displays, since they can produce legible text in eighty columns as well as display medium-resolution and high-resolution graphics. They'll also display color-on-color printing and graphics.

There are currently two manufacturers making IBM-compatible ready-to-use RGB monitors—Amdek and Electrohome. There are many other RGB monitors on the market, but these two are sold ready-to-use, and both have a sixteen-color display capability. Most RGB monitors will only display eight colors, and many require electrical modification in order to work with the Personal Computer.

Composite video monitors comprise the remainder of the IBM-compatible displays. These include black and white televisions and monitors as well as composite color monitors. The term composite in this context means that the monitor does not respond to separate red, blue, and green signals.

If you use a television set, you'll need to modulate the computer's signal to a frequency that the set can tune in, and this requires that you purchase a radio-frequency modulator.

Most composite color monitors, including television sets, can only accurately display up to forty characters on a line. Furthermore, most of them will not display anything legible if you try to print orange on a green background; all you'll get by doing that is a blur of color.

If you use a good black and white video monitor, you'll be able to read either forty or eighty character lines, but, of course, you won't get to take advantage of the pc's color graphics features. Δ

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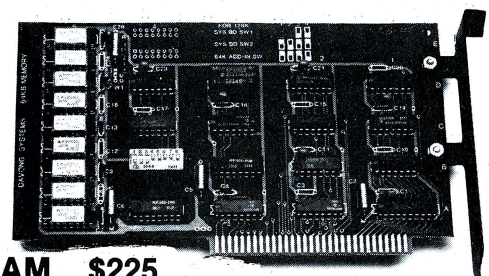

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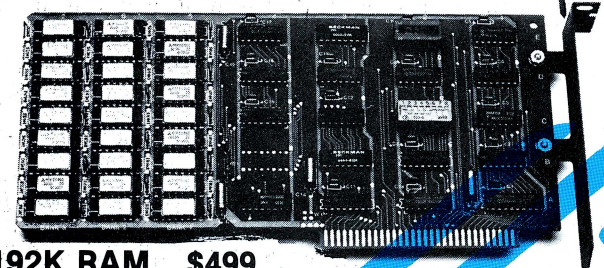

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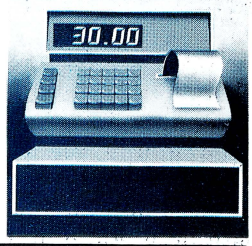

Followers of the microcomputer marketplace will find no surprise in the first *Softalk* Bestsellers list measuring sales of software for the Personal Computer. It was *VisiCalc* by a landslide.

EasyWriter, for all the panning it's received from some quarters, was a clear second choice, reflecting the need of pc owners to do something other than run spreadsheets with their machines. *EasyWriter* appears to be facing a severe challenge in the future, both from its kith and kin and from the outside. *EasyWriter II* was showing some strength in the marketplace in late April, and *WordStar* was the hottest selling program in the country during its first week of general release in May.

Computer users have always loved quality games and that general proclivity seems to be holding in this marketplace as well. *Temple of Apshai*, the most innovative program of its genre when it was first introduced, made the translation to pc and was third in sales for the month of April. *Adventure*, the original main frame multiauthor game that was downloaded for micros by Microsoft, was fourth.

The Information Manager, the lone database program extant, nailed down fifth with the *Peachtree General Ledger* and *Peachtree Accounts Receivable* packages tied for sixth. Pascal, not as an operating system but as a language running under PC-DOS, was eighth, and the *Accounts Payable* and *Inventory* modules of Peachtree's system tied for the ninth and tenth spots.

The *Softalk* poll methodology measures the number of units of software actually going into the hands of end users during the polling period. In this case, Computerland stores were called during the first two weeks of May to measure sales for the month of April.

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softalk presents the bestsellers

Stores are selected for polling from a list of outlets that have volunteered to participate.

Each month a cross section of those volunteers is chosen. The cross section reflects the true demographics of the marketplace in terms of size, geographical location, volume of sales, and areas of store interest. Relative to this last category, the pc market has not yet seen the diffusion of some other markets, where some stores emphasize entertainment software, others business software, and yet a third group specializes in utility and programming aids.

The Index gives a relative measure of the strength of the programs in the marketplace. A program with an Index of 50 sold twice as many units as a program with an Index of 25. The starting point for the Index varies each month and the Index has no correlation from month to month. Because the Index is relative, a program with an Index of 25 one month and 50 another month may have sold more copies in the month when its Index was 25.

Because *VisiCalc* is such a dominant program in all its markets, a more useful construct is to set the Index relative to the second-place program. Using the sales of the runner-up as a gauge, the Index is set somewhere between 90 and 100 and all other Index numbers are calculated from that starting point.

Information on authors and publishers uses the following conventions: Where the genesis of a program is a company, within which there were key creative people, both the company and the creators are listed. If the author served as a translator of the program from other systems, the original authors are listed in parentheses. In the situation where the distributing entity is not the original publisher, the publisher is listed in parentheses behind the name of the distributor.

Germane to a complete picture of the marketplace is the increased flow of new product. Outlets depending only on IBM or their software distributor for product are selling proportionately fewer software units than their more adventurous cousins that are open to buying from individual software publishers. Whether any of those independents have programs that will stand the test of national scrutiny remains to be seen. Δ

IBM Personal Computer sales outlets representing approximately 8.3 percent of all sales of pc and pc-related products volunteered to participate in the poll.

Respondents were contacted early in May to ascertain their sales for the month of April.

The only criterion for inclusion on the list was the number of units sold—such other criteria as quality of product, profitability to the computer store, and personal preference of the individual respondents were not considered.

Respondents in May represented every geographical area of the continental United States.

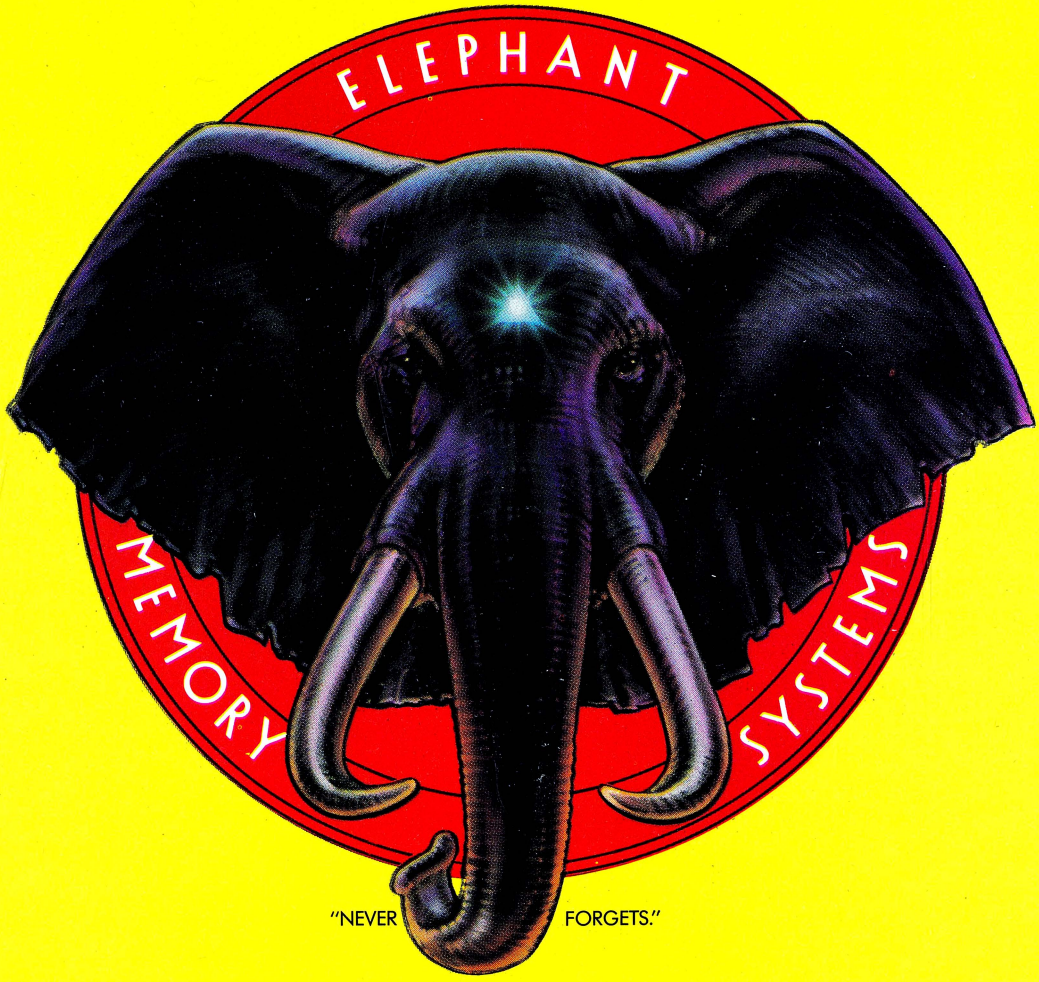
Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only for the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 3.4 percent, which translates roughly into the theoretical possibility of a change of 2.79 points, plus or minus, in any index number.

the top thirty

This Month	Index	
1.	230.94	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston; VisiCorp, IBM
2.	97.15	**EasyWriter,** John Draper; IBM (Information Unlimited Software)
3.	44.60	**Temple of Apshai,** Jeff Johnson, John Freeman, and J.W. Connelley; Automated Simulations
4.	41.41	**Microsoft Adventure,** Gordon Letwin (Will Crowther and Don Woods); IBM (Microsoft)
5.	39.82	**The Information Manager;** Innovative Software
6.	38.22	**General Ledger;** IBM (Peachtree Software)
	38.22	**Accounts Receivable;** IBM (Peachtree Software)
8.	36.63	**IBM Pascal,** Microsoft; IBM
9.	35.04	**Accounts Payable;** IBM (Peachtree Software)
	35.04	**Inventory;** IBM (Peachtree Software)
11.	30.26	**Time Manager,** Dick Ainsworth, Al Baker, and Jeffrey P. Garbers; IBM (Microsoft)
12.	27.08	**Home Accountant,** Mike Farmer, Bob Schoenburg, Larry Grodin, and Steve Pollack; Continental Software
13.	22.30	**General Accounting,** John Moss and Ken Debower; BPI
	22.30	**Las Vegas Blackjack,** Charles Montante; Quala
	22.30	**Space Guardian;** Omric
16.	20.71	**Dow Jones Portfolio Evaluator,** Dow Jones & Co.; IBM
17.	19.11	**Typing Tutor,** Michael Sierchio (Dick Ainsworth and Al Baker); IBM (Microsoft)
	19.11	**Everest Explorer,** Andrew Bartorillo (William Godwin and Don Knowlton); Acorn Software
19.	14.33	**Arithmetic Games, Set 1,** Science Research Associates; IBM
	14.33	**Arithmetic Games, Set 2,** Science Research Associates; IBM
	14.33	**Fact Track,** Science Research Associates; IBM
22.	12.74	**Speed Reader,** Jan Davidson and Rick Eckert; Davidson & Associates
	12.74	**Asynchronous Communications Support;** IBM
24.	11.15	**Cyma General Ledger,** David Thomas; Cyma
	11.15	**Fortran Compiler,** Microsoft; IBM
	11.15	**VideoGraph 88;** Windmill Software
27.	9.56	**Macro Assembler,** Microsoft; IBM
28.	7.96	**Answer;** North American Data Systems
	7.96	**CompuCube,** Richard Stauduhar; Stoneware
	7.96	**Championship Blackjack,** PC Software; Cavalier Computer

REMEMBER.



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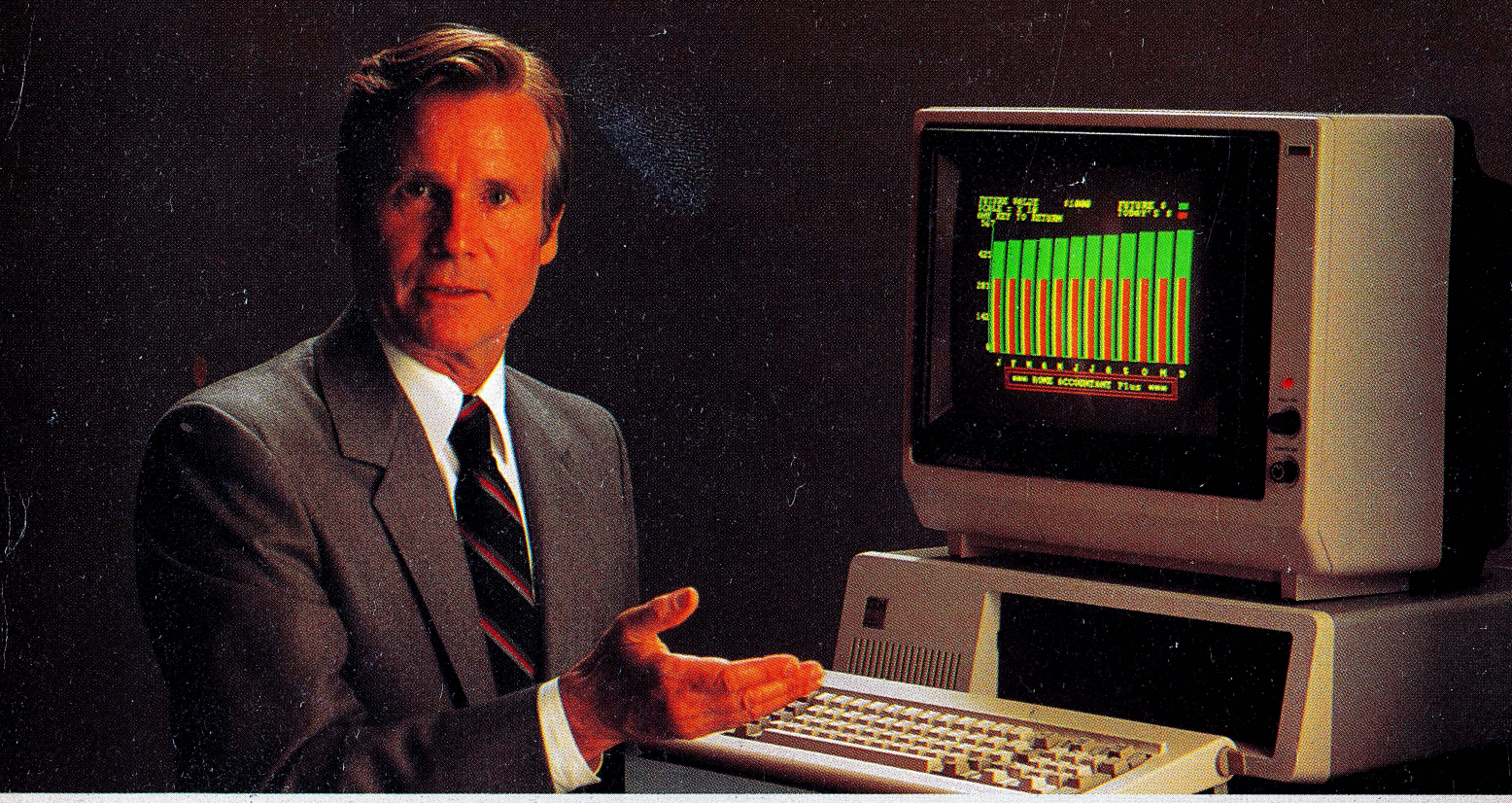

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